STOCK MARKET AND ECONOMIC GROWTH IN ASEAN-5

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2017

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THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

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ABSTRACT

The aim of this study is to analyze the effect of the financial crisis on economic growth through stock market in ASEAN-5. In particular it analyzes to what extent the financial and non-financial markets effect economic growth through three indices, stock markets, banks and real estate. The study used quarterly data covering the period 1990:Q1 to 2016:Q4 for Indonesia, Malaysia, the Philippines, Singapore and Thailand. Using analysis of cointegration, vector error correction model (VECM), Granger causality test, impulse response function (IRF) and variance decomposition analysis (VDC), the study found that the effects of stock market on economic growth were different among the countries. The empirical finding from PECM shows that the significant effects of stock market and banks index on economic growth is higher as compare to real estate. This significance effect of stock market on economic growth in Indonesia, Singapore and Thailand is due to the short-run capital inflows from foreign investors. The financial sector in particular the stock market tends to stimulate and promote economic growth when monetary authorities adopt liberalized investment and openness policies, improve the size and the regulations of the stock market, and increase the macroeconomic stability. Interestingly, the effect of sectoral stock indices via stock market, banks and real estate on economic growth is different when the Asian and global financial crises were considered in the model. The findings show that the global financial crisis has no significant effect on economic growth in ASEAN-5 when various sectors are considered into the model. This finding provides evidence that stock market and banking indices contain leading information for economic activity.

Keywords: stock market, economic growth, banks, real estate, financial crisis

PASARAN SAHAM DAN PERTUMBUHAN EKONOMI DI ASEAN-5

ABSTRAK

Tujuan kajian ini adalah untuk menganalisis kesan krisis kewangan terhadap pertumbuhan ekonomi melalui pasaran saham di ASEAN-5. Khususnya ia menganalisis sejauh mana pasaran kewangan dan bukan kewangan memberi kesan kepada pertumbuhan ekonomi melalui tiga indeks, pasaran saham, bank dan hartanah. Kajian ini menggunakan data suku tahunan yang meliputi tempoh 1990: Q1 hingga 2016: Q4 untuk Indonesia, Malaysia, Filipina, Singapura dan Thailand. Dengan menggunakan analisis kointegrasi, model pembetulan kesilapan vektor (VECM), ujian kausal Granger, fungsi tindak balas impuls (IRF) dan analisis penguraian varians (VDC), kajian mendapati kesan pasaran saham terhadap pertumbuhan ekonomi adalah berbeza di antara negara-negara. Temuan empirikal dari PECM menunjukkan bahawa kesan penting pasaran saham dan indeks bank terhadap pertumbuhan ekonomi lebih tinggi berbanding dengan hartanah. Kesan pentingnya pasaran saham terhadap pertumbuhan ekonomi di Indonesia, Singapura dan Thailand disebabkan aliran masuk modal jangka pendek dari pelabur asing. Sektor kewangan khususnya pasaran saham cenderung untuk merangsang dan mempromosikan pertumbuhan ekonomi apabila pihak berkuasa kewangan mengamalkan dasar pelaburan dan keterbukaan yang diliberalisasikan, meningkatkan saiz dan peraturan pasaran saham, dan meningkatkan kestabilan makroekonomi. Menariknya, kesan indeks saham sektor melalui pasaran saham, bank dan hartanah pada pertumbuhan ekonomi adalah berbeza apabila krisis kewangan Asia dan global dipertimbangkan dalam model itu. Penemuan menunjukkan bahawa krisis kewangan global tidak memberi kesan yang signifikan terhadap pertumbuhan ekonomi ASEAN-5. Penemuan ini membuktikan bahawa indeks pasaran dan indeks perbankan mengandungi maklumat utama untuk aktiviti ekonomi.

Keywords: pasaran saham, pertumbuhan ekonomi, bank, hartanah, krisis kewangan

ACKNOWLEDGEMENTS

All praise and thanks due to Allah, Lord of the Worlds, for His innumerable bounties and favors. This dissertation would not have been accomplished without the will of Allah and then help of many people.

First of all, I would like to express my gratitude to my examiner, Dr. Aslam Gulam, and my supervisors, Dr. Zarinah Yusof and Dr. Cheong Kee Cheok, and thank them for their enthusiastic guidance and inspirational support during the writing of this dissertation. I would like to acknowledge their fully instruction, critical review and detailed feedback for every single chapter of my thesis that help me to accomplish my dissertation. I absolutely could never have done this dissertation without their help.

I would like to acknowledge the financial assistance that I received from University Technology Mara (UiTM) and the Ministry of Education Malaysia. I would also like to acknowledge the great support from all my friends and staff at the Faculty of Economics and Administration throughout my PhD programme. It would be a long list to mention all friends I am indebted to, but I gratefully thank them all.

My sincere appreciation goes to my late mother and father, Suharjiah Hj. Tomari and Samsi Mat Rejo who passed away before the completion of this programme. I am eternally grateful to both of them for their patience and sacrifice in making me what I am today. I would like to thank my brothers and sisters for their continued support and prayers. Special thanks to my father and mother in-law for their prayer and constant encouragement. My deepest gratitude goes to my husband, Mohd Khairul, and to my daughter, Qistina Qaisara, for continuous support, encouragement, patience and love, is a wonderful blessing to me. There are no words to express how grateful I am to have them by my side for all the time.

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LIST OF SYMBOLS AND ABBREVIATIONS

Common Abbreviation

e.g	:	(*exempligratia*) for example
et al.	:	(*et alia*): and others
etc	:	and so fourth
i.e	:	that is
vol.	:	volume

Notes of Abbreviations

ADF	:	Augmented Dickey-Fuller
AEC	:	ASEAN Economic Community
AIC	:	Akaike Information Criterion
ARDL	:	Autoregressive Distributed Lag
ASEAN	:	Association of Southeast Asian Nations
BLR	:	Base Lending Rate
BOT	:	Bank of Thailand
BSP	:	Bangko Sentral ng Pilipinas
CCR	:	Core Capital Ratio
CIMB	:	Commerce International Merchant Bankers Bhd.
CUSUM	:	Cumulative Sum Control
DBS	:	The Development Bank of Singapore Limited
ECT	:	Error Correction Term
ETP	:	Economic Transformation Programme
EU	:	European Union
GDP	:	Gross Domestic Product

GFC	:	Global Financial Crisis
GLS	:	General Least Squares
GMM	:	Generalized Method of Moments
IDR	:	Indonesian Rupiah
IMF	:	International Monetary Fund
IMF	:	International Monetary Fund
IRF	:	Impulse Response Function
JB	:	Jarque-Bera
JJ	:	Johansen and Juselius
JKSE	:	Jakarta Stock Exchange
KLSE	:	Kuala Lumpur Stock Exchange
KPSS	:	Kwiatkowski-Phillips-Schmidt-Shin
M2	:	Broad Money
MA	:	Moving Average
MAS	:	Monetary Authority of Singapore
MIDA	:	Malaysian Investment Development Authority
MRT	:	MY Rapid Transit
MYR	:	Malaysian Ringgit
NPA	:	Nonperforming Asset
NPL	:	Nonperforming Loans
OCBC	:	Oversea-Chinese Banking Corporation
OLS	:	Ordinary Least Squares
P/E	:	Price Earnings Ratio
PECM	:	Parsimonious Error Correction Model
PHP	:	Philippines Peso
PP	:	Phillips-Perron

PR1MA	:	Malaysia People's Housing
PSEi	:	Philippines Stock Market Composite Index
REMU	:	Regional Economic Monitoring Unit
ROA	:	Return on Assets
RWCR	:	Risk-Weighted Capital Ratio
SBC	:	Schwarz Bayesian Criterion
SET	:	Bangkok Stock Exchange
STI	:	Singapore Stock Exchange
SUR	:	Seemingly Unrelated Regressions
THB	:	Thailand Baht
UOB	:	United Overseas Bank Limited
U.S.	:	United States
VAR	:	Vector Autoregressive
VDC	:	Variance Decomposition
VECM	:	Vector Error-Correction Model
WB	:	World Bank

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CHAPTER 1: OVERVIEW OF STUDY

1.1 Introduction

Stock market-economic growth link has been a subject of great interest among economists in recent years. However, there remains much disagreement over the ways stock market and economic growth interact and the extent to which financial sector can promote economic growth. The debate has traditionally revolved around two issues. The first relates to whether the financial sector is sufficient to justify changes in growth. The second relates to what extent the financial sector affect economic growth in the presence of crisis. A growing body of literature has emerged, both at the theoretical and empirical level, attempting to answer the above questions. No clear consensus has been reached on either issue. Relative to the first issue, two opposing views have emerged from the theoretical literature. There are those who argue that stock market adversely affect economic growth. They emphasize that persistent stock market declines can be interpreted as the harbinger of economic slowdown, lowering consumer confidence and the business outlook, which in turn leads to decline in investment. But then, the studies that examine these issues found that the development in the stock market do not significantly influence economic growth. There is no clear consensus on the issues that have been mentioned above and thus, the connection between stock market and economic growth remains controversial.

The innovation and development of the stock market has marked an essential progress in global financial markets. The stock market provides important channel to raise capital into the economy and to stimulate growth. However, at the same time it poses a potential risk to the economy. The world has witnessed a number of stock market crashes as well as volatility in stock market returns through the financial crisis, such as the 1997-1998 Asian crisis and the 2007-2008 global financial crisis. Such

accidents result in a decline in corporate profits, and an increase in business failure has had a major effect on economic growth. Among the various concerns about the diverse scope of the stock markets, both academicians and practitioners have been investigating the determinants of stock returns as well as the cause of uncertainty in stock returns from macroeconomic perspectives (Chen et al., 1986; Fama and France, 1989; Hsing, 2011; Kuwornu, 2012 ; Zakaria and Shamsuddin, 2012). Although the outcomes vary by market and different periods of time, this allows investors to make better financial decisions, assist policymakers in adjusting monetary policy, and benefit all financial researchers and analysts who are keen to have a better understanding of the stock market movement and explore new advanced frameworks for the development of this market. The benefits in terms of results explain why the topic of the relationship between stock market and economic growth remains attractive not only in developed countries, but also in developing countries

A motivation of the study lies in the possibility that the failure of financial sector could adversely affect economic growth. The concern of this study is related to the failure and collapses of major financial institutions in the United States and Europe that caused the economic downturn and indirectly has an effect on the developing countries. Thus, this study attempts to examine the channels of stock returns on growth and links the effects of global financial crisis in five ASEAN countries. Assessing the relationship from sectoral data may give more accurate assessment of the effects of stock return indices on the level of economic growth. This also implies that growth may be more sensitive to certain sectoral stock return indices. This can be used as a benchmark to assess how far growth is affected by the financial crises as claimed in the empirical studies (Stiglitz, 1999; Kutan et al., 2012).

1.2 Problem Statements

The important role played by emerging markets in the world's economy has been boosted by their integration into the global markets at both the macro and micro levels. Particularly, emerging economies' share of world gross domestic production (GDP) has been growing rapidly, as during 2010-2015 they accounted for about 79 percent of the global output in terms of purchasing power parity (PPP) measurement compared to 45 percent in 2010 and 36 percent at the beginning of the 1990s (IMF World Economic Outlook Database). However, due to the typical risk of political and financial instability, emerging markets may suffer from more fragility and more sensitivity to breakdowns in different phases of their economies than advanced economies (IMF, 2015). The Asian Financial Crisis 1997-1998 is one example, which had a direct effect on the economies of many emerging markets in the region, like Thailand, Indonesia, and Malaysia. Among various causes of this crisis, Nanto (1998) reported the main reason as those industrialized economies had been growing quickly without sufficient regulation, oversight, and government controls. He also stated that the crisis stemmed from those economies' dependence on external borrowing, their inadequate financial system, especially banking system, and the weak regulation of their governments.

The Global Economic Prospects (WB, 2014) reported that the economies of emerging markets are possibly more influenced by global than domestic factors. The crisis in the US during 2007-2008, has not only effect the growth of developed economies, but also affected the growth of emerging markets. According to the IMF's World Economic Outlook (IMF, 2014), while the US was projected to grow at 2.8 percent in 2014 and the Eurozone recovery was aimed to reach 1.2 percent of growth, the growth rate of emerging markets was expected to be sluggish at around 4.9 percent in the same period. Additionally, the 'tapering' strategy from the US since December 2013 has a certain effect on several emerging economies, especially in East Asia and

Central Asia (Atkins, 2014). Atkins argued that capital flows into emerging markets are majorly affected by external forces. Furthermore, the effect of slow global economic growth, plus the uncertainty inside the global economy, has caused large volatility in emerging stock markets. A variety of big stock market indexes experienced continuous sharp declines in the first half of 2014, such as the MSCI (Morgan Stanley Capital International), the SHCOMP (Shanghai Composite Index) and HSCEI (Hang Seng China Enterprises Index) (China), and Micex Index (Russia), etc.

One of the contentious issues in the study of financial development and economic growth especially in time series studies is the direction of causality. Patrick (1966) explains that finance can lead to economic growth through what he terms the "supply-leading" hypothesis; and equally that economic growth can also stimulate financial development - he calls this the "demand following" hypothesis. Ever since the formulation of these hypotheses, empirical conclusions on the direction of causality between financial development and economic growth have remained inconclusive. In fact, there is a broad consensus emphasizes that the persistent financial market declines can be interpreted as the harbinger of economic slowdown, lowering consumer confidence and the business outlook, which in turn leads to decline in economic growth.

Apart from that, the empirical findings from the previous studies that examined this issue show inconclusive findings and found that the development in financial sector does not encourage economic growth.[1] Yet, none of the studies reject the importance of financial development on economic growth despite minimal evidence was found (Mansor, 2007). The disparities in the views indicate that further examination on the issues is required. It is believed that by estimating the channels using the error correction model (ECM) would provide more conclusive findings. The Johansen's

[1] The studies with this view include those of Al-Malkawi et al. (2012), Ellahi and Khan (2011), Goaied and Sassi (2011), Ince (2011), Kar et al. (2011), Majid et al. (2010), Handa and Shubha (2008), Ang and McKibbin (2007), Wong (2005), Al-Yousif (2002), Shan et al. (2001)

maximum likelihood estimation would be able to identify the importance of stock market and banking sector in the economy via the cointegration relationship. Although research on this issue has been studied extensively in developed countries, little can be reviewed in the experience of developing countries. Thus, this study uses an aggregated data from the stock market index to investigate the effect of the financial crisis on economic growth via stock market, banks and real estate. Using aggregated data from the stock market may bring new evidence and resolve conflicts in previous findings on the channels of stock market and economic growth.

1.3 Research Aim, Objectives and Questions

The aim of this study is to analyze the effect of the financial crisis on economic growth through stock market in ASEAN-5 and consider an appropriate strategy for policymakers to undertake successful continuation of economic growth development.

Objective 1: To identify the main sectoral stock index that affect economic growth. The findings of the results may give some idea of magnitude effects of the stock market, banks and real estate on economic growth.

Objective 2: To examine causal linkages between stock market on economic growth. This involves examining the relationship of financial and non-financial sector on economic growth.

Objective 3: To measure the effect of Asian and global financial crisis on economic growth in a model that considering various sectoral indices, with particular reference to stock market, bank and real estate.

Objective 4: To estimate the influence of economic growth on the volatility of sectoral indices in ASEAN-5. The dynamic analysis of the impulse response functions and variance decomposition is focused in this objective to investigate for a shock from economic growth on the movement of stock markets, bank and real estate.

To achieve the primary aim and objectives of the study, several research questions were designed. The following questions are to be answered by this research.

Question 1: To what extent sectoral indices affect economic growth in ASEAN-5? Which of the sectoral indices is most contributing to economic growth?

Question 2: Is there a causal relationship between economic growth and sectoral indices of stock market, bank and real estate in ASEAN-5?

Question 3: Are the effect of the Asian and global financial crisis has a significant effect on economic growth? To what extent Asian and global financial crises affect economic growth in ASEAN-5?

Question 4: Does the economic growth respond to the shocks in stock market, bank and real estate? Which of the sectoral indices shocks most?

In order to achieve the first objective, the study examines the relative strength of stock market, banks and real estate on economic growth. The question was addressed by reviewing the effect of each sector on economic growth. The findings of the results give some idea of how much the magnitude of the effects of the financial and non-financial sectoral indices on economic growth. The findings are then compared, when appropriate, with those reported in other countries. In order to achieve the second objective, the relationship between stock market and economic growth is described in terms of the analysis of Granger causality. The findings are additionally explaining the causal link of financial and non-financial sector on economic growth, whether there are any unidirectional or bidirectional causal relations among the specified variables.

In order to achieve the third objective, the aim is to measure the effect of Asian and global financial crisis on economic growth in a model that considering various sectoral indices, with particular reference to stock market, bank and real estate. This is also described via the analysis of parsimonious error correction model (PECM). In parsimonious analysis, parameter estimates are derived by dropping some of the insignificant variables from the estimated model and retaining only the desirable variables. The resultant model is checked in terms of diagnostic tests on the residuals together with parameter constancy involving the recursive properties of the model, such as the residuals test and Chow F-test.

With regard to the fourth objective, the impulse response functions and variance decomposition analysis of the variance of decomposition are used to investigate the

effects of stock market, bank and real estate to shocks on economic growth. This analysis allows us to know which of these variables is relative endogenous or exogenous to the system by simply decomposing proportional variances due to its own shock and shock of other variables in the system. For example, if the shocks of other independent variables in the system explain less of the forecast error-variance of the dependent variable, it means that the dependent variables are exogenous to the system. However, if it turns out that most of the shocks of the independent variables explain the forecast error of dependent variables, it means that it is then endogenous to the system.

1.4 Contributions of Study

This research intends to improve the validity of various econometric methods, including the Johansen cointegration tests, Granger causality tests, parsimonious error correction models (PECM), impulse response functions (IRF) and variance decomposition (VDC) analysis in explaining the stock market influences on economic growth and its volatility within the context of ASEAN-5 stock market.

The research firstly employs Johansen cointegration tests (Johansen 1988; 1991; 1995) under the VAR framework to study the existence of cointegration between stock markets and economic growth for both long- and short-run dimensions. The Granger causality tests are followed to clarify the direction of any existing interactions and to verify the results of cointegration (Granger 1969; 1983). Furthermore, since one stylized character of economic time series is that its volatility changes over time rather than remaining constant, further statistical analysis applies IRF and VDC are extended to measure the volatility of stock market and then to investigate the determinants of the stock market volatility from economic growth. The combination of these advanced models is therefore expected to comprehensively broaden the picture of the link among stock market and economic growth performance.

Secondly, the study proposes its unique multivariate model, which consists of three models: stock market, bank and real estate. To the best of our knowledge, to date, there is not much evidence analyzing disaggregated data from the sectoral stock market index to examine the effects of a shock on economic growth through stock markets, banks and real estate channels. This channel remains unexplored and may give a significant outcome to the findings. Analyzing the shocks of financial and non-financial sector on economic growth can give better explanations and comparative evidence on the channels of stock market-economic growth nexus in the developing countries. The inclusion of sectoral estimates from stock market index can provide more meaningful

evidence on financial and non-financial sector capability to stimulate economic growth. This approach not only provides comparison of findings in developing countries, but also better understanding on how far the growth is respond to the shock within the framework of economies models. It is the interest of this study to examine the shocks of sectoral stock indices on economic growth when they are introduced simultaneously in the model. This will allows us to gauge the effects of the sectors more meaningfully and draw useful policy implications.

Thirdly, the outcomes of this study are expected to be of direct importance to policymakers. The capability of economic growth to explain the movement of stock market in ASEAN-5 may suggest appropriate amendments to macroeconomic policies to improve the health of the ASEAN capital sector and vice versa and afterwards accelerate the development of the ASEAN-5 financial sector. Furthermore, the expected outcomes offer benefits to other current participants or perspective participants in the capital market, from practitioners (such as investors; portfolio managers; financial consultants) to academic researchers and financial analysts.

Last but not least, this study contributes to the existing literature on the knowledge of developing countries, in particular emerging markets. In much of the similar literature, the empirical study on the stock market and economic growth is inconclusive. Thus, investigating the link between stock market and economic growth, particularly in ASEAN-5, has remained critical, given that the ASEAN stock market is still developing.

1.5 Organization of Study

The study is organized as follows: Chapter Two provides an overview of the economic growth and financial sector in Indonesia, Malaysia, the Philippines, Singapore and Thailand (ASEAN-5). It discusses the financial sector of stock market, banks and real estate in each country. Later, the effect of the global financial crisis on ASEAN economic growth and financial system is highlighted

Chapter Three discusses the theoretical framework related to the stock market and economic growth. It discusses the relevant theories used in this study. The theories are the quantity theory of money, the loanable funds theory, liquidity preferences, Mundell-Tobin effect and Van Wijnbergen IS-LM model. The second section of this literature chapter discusses finance-growth transmission channels relating to stock market and economic growth. The transmission channel is divided into three channels: stock price, bank lending and real estate price channels. Then, the third section discusses the empirical studies on stock market and economic growth.

Chapter Four discusses the methodology and data. Firstly, it discusses the data and its sources followed by the explanation on the selected variables and estimating model. Next, it discusses the methodological framework of the vector autoregressive (VAR), followed by the parsimonious error correction model (PECM), Granger causality test, impulse response functions (IFRs) and finally variance decomposition (VDC). It outlines how the long-run relationship is embodied in the PECM. After defining the methodology, explanation on the econometric procedure is discussed. The stationarity tests of the data discussed are the Augmented Dickey Fuller test, Phillip-Perron test (1988) and Kwiatkowski-Phillips-Schmidt-Shin test (1992). Next, it discusses the cointegration relationship of the variables. The Johansen-Juselius cointegration analysis explains cointegration in a multivariate framework. Discussions on the diagnostic tests are also reported.

Chapter Five presents the empirical findings. Specifically, it discusses and analyzes findings from unit root test, cointegration test, PECM on aggregate output with financial and non-financial sector. The subsequent section employs Granger causality analysis for multiple time series to find evidence of causal links between stock market and economic growth along with other monetary variables. The discussion is continued with the impulse response functions (IRFs) and variance decompositions analysis (VDC).

Chapter Six summarizes the research findings and addressing the research questions. Next, the section continues with the discussion of research contributions and policy implications.

CHAPTER 2: REVIEW OF ASEAN ECONOMY AND STOCK MARKET

2.1 Introduction

This section views the background of economic growth and financial sector in five ASEAN countries of Indonesia, Malaysia, the Philippines, Singapore and Thailand. The study found that the ASEAN countries have undergone profound transformations and have grown faster than other regions in the world, excluding the high-performing North-East Asian economies in the past thirty years. It was also found that each of ASEAN country has experienced substantial industrial diversification and fast economic growth due to the adoption of export-oriented trade policies, the rapid flow of foreign direct investment, and soundness macroeconomic policies. Although, the Asian and global financial crises has reduced both the absolute and relative demand from ASEAN's major partners, cause the global production networks damage, and affect the intra-regional trade. Still, the development in the economic growth in five ASEAN countries has shown a strong recovery aftermath of the Asian and global crises. This part of the review discussed the development of the financial sector in ASEAN-5. This helps to understand the process of development and growth of the financial sector in five ASEAN countries. Finally, the effect of the Asian and global financial crisis on ASEAN countries is discussed to understand the respond of the crisis on economic growth and financial system as a whole.

2.2 Stock Market and Economic Growth in ASEAN-5

The stock market of ASEAN, namely Indonesia, Malaysia, the Philippines, Singapore and Thailand have undergone substantial liberalization since the late 1980s and early 1990s (International Finance Corporation, 1993; World Bank, 1997). These five stock markets have a long history in the financial market. The Malaysia stock exchange was set up in 1960 and Singapore in 1973. In 1973 when Singapore left Malaysia, the Malayan stock exchange was split into the Kuala Lumpur Stock Exchange (Malaysia) and the Singapore Stock Exchange (Singapore). Meanwhile, the Jakarta Stock Exchange (Indonesia) was established in 1977, the Manila Stock Exchange (Philippines) in 1927 and Bangkok Stock Exchange (Thailand) in 1962. The ASEAN stock markets remained relatively small in terms of market capitalization until the late 1980s. However, the ASEAN stock market has grown rapidly since 1992, following the increase in investment from foreign investors to diversify their portfolios in the Asian region.

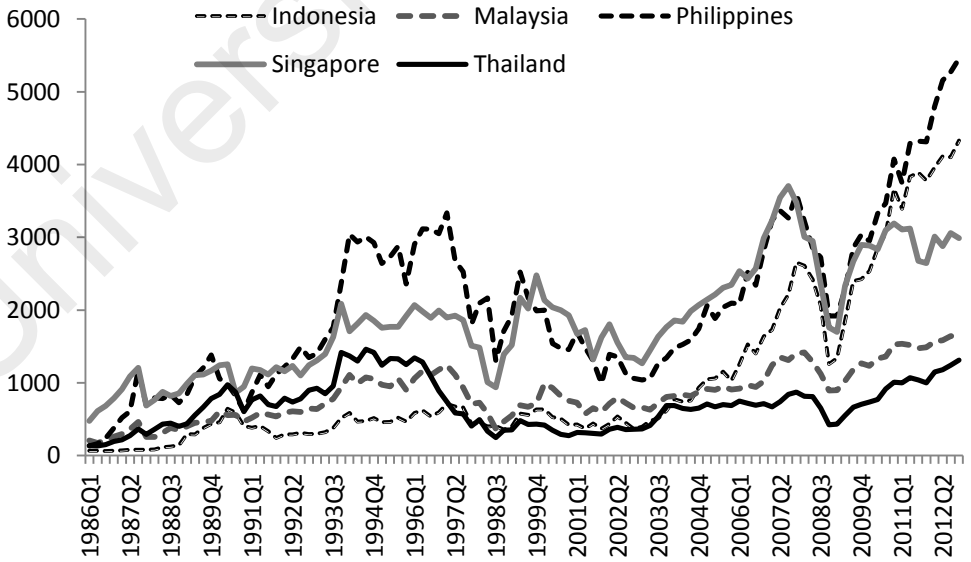
Table 2.1 shows the growth of the ASEAN stock markets in the 10-year period. The ASEAN stock market is dominated by the Malaysian stock market and Singapore stock market. As can be seen from Table 2.1, the ASEAN stock markets experienced high growth in market capitalization in the 10-year period since 1992. Although, the Indonesian stock market growth has shrunk since 1992. Growth in ASEAN stock markets has shown an increase in the trading value of company and the number of companies listed (Hee Ng, 2002). In fact, the trading volume is also taking into account the substantial decline in the value of ASEAN stock markets in 1997 following the Asian financial crisis and the global financial crisis in 2008-2009.

Table 2.1: Growth of the ASEAN Stock Markets

	Market capitalization of listed companies (current $)			Market capitalization of listed companies (% of GDP)		
	1992	2002	2012	1992	2002	2012
Indonesia	1200	2999	39677	8.6	15.3	45.2
Malaysia	9400	12387	47634	158.9	122.8	156.9
Philippines	1530	3902	26414	28.9	48.0	105.6
Singapore	4880	10190	41413	99.5	112.5	150.8
Thailand	5830	4617	38300	52.3	36.4	104.7

Source: Asian Development Bank (ADB), The World Bank.

Meanwhile, as can be seen in Figure 2.1, the ASEAN stock markets show increases trend from 1986 until the second quarter of 1996, and later show a downward trend in the third quarter of 1998 till the early-1999. The ASEAN stock markets also start to decline in late-2008 due to global economic downturn. The Asian and global financial crisis has adversely affected the ASEAN stock market and financial system through "contagion effect". This "contagion effect" can cause the sudden rise in risk aversion and financial market volatility because financial markets are highly integrated at the global level.



Source: Datastream database 5.1.

Note: Quarterly observation of the local currency total index.

Figure 2.1: ASEAN Stock Markets Performance 1986:Q1 – 2012:Q4

Table 2.2 illustrates GDP growth, market capitalization and nonperforming loans for 2002 to 2012 in the five ASEAN countries. The ratio of delinquencies and nonperforming loans to total loan in Indonesia went down to 2.1 percent in 2012 as compared to 24.0 percent in 2002. In June 2010, the Central Bank of Indonesia (BI) introduced a policy package to develop money markets. A wider range of instruments has been provided, and banks have been encouraged to conduct more transactions in the wholesale market. Thus, the soundness of the banking sector has improved over time. For the Malaysian banking system, the ability to rein in loan impairment during the global economic downturn has caused the fall in gross NPL ratios from 6.5 percent in 2007 to 3.4 percent in 2010, even the growth of GDP contracted by 1.6 percent in 2009. The nonperforming loans were in healthy levels. In fact, the Malaysian banking system operates within a diversified financial system, with a developed capital market.

The percentage of NPLs in the Philippine banking sector decreased from a peak of 26.5 percent in 2002 to 2.4 percent in 2012. In brief, the banking system in the Philippines relatively stable due to the reforms that were put in place since Asian financial crisis in 1997. As can be seen in Table 2.2, Singapore's banking sector remains strong and has improved since the 1997 Asian financial crisis. The asset quality improved with nonperforming loans at 1.0 percent of total loans in 2012, down from 7.7 percent in 2002. The stock market capitalization grew from $101.9 billion in 2002 to $414.1 billion in 2012 before falling to $180 billion in 2008. Meanwhile, the asset quality of Thai banks has improved over the past 10 years, with the sector’s NPL ratio dropped from 15.7 percent to 2.7 percent at end-2012. Over the same period, the GDP growth increased from 5.3 percent in 2002 to 6.5 percent in 2012. As a whole, the banking sector in Thailand is moderate as compared to other ASEAN countries.

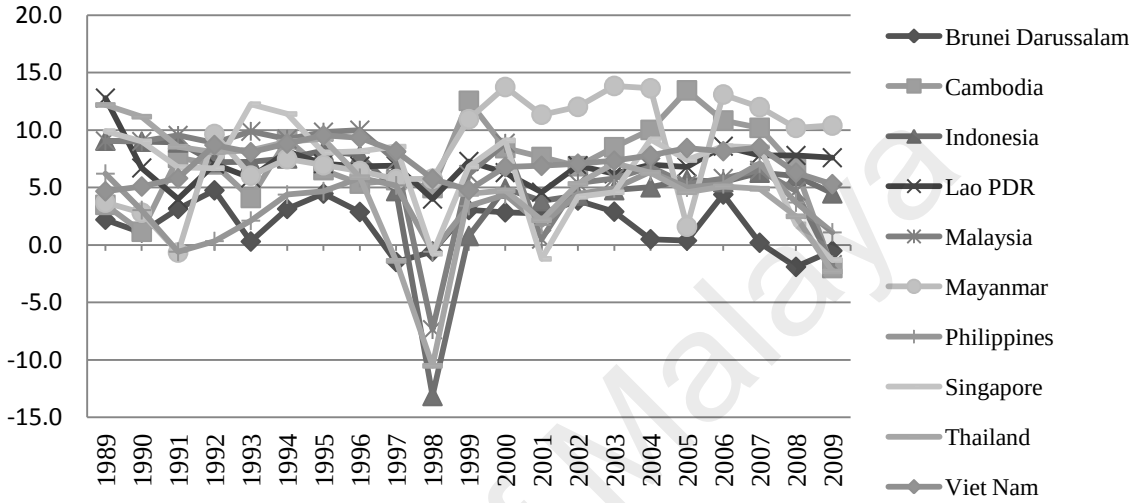
Table 2.2: ASEAN GDP Growth, Market Capitalization and Nonperforming loans in 2002–2012

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
GDP Growth (%)											
Indonesia	4.5	4.8	5.0	5.7	5.5	6.3	6.0	4.6	6.2	6.5	6.2
Malaysia	5.4	5.8	6.8	5.3	5.6	6.3	4.8	-1.5	7.2	5.1	5.6
Philippines	3.6	5.0	6.7	4.8	5.2	6.6	4.2	1.1	7.6	3.6	6.8
Singapore	4.2	4.6	9.2	7.4	8.6	9.0	1.7	-0.8	14.8	5.2	1.3
Thailand	5.3	7.1	6.3	4.6	5.1	5.0	2.5	-2.3	7.8	0.1	6.5
Bank Nonperforming Loans to Total Gross Loans (%)											
Indonesia	24.0	6.8	4.5	7.4	6.1	4.0	3.2	3.3	2.5	2.1	2.1
Malaysia	15.9	13.9	11.7	9.6	8.5	6.5	4.8	3.6	3.4	2.7	2.2
Philippines	26.5	16.1	14.4	10.0	7.5	5.8	4.5	3.5	3.4	2.6	2.4
Singapore	7.7	6.7	5.0	3.8	2.8	1.5	1.4	2.0	1.4	1.1	1.0
Thailand	15.7	13.5	11.9	9.1	8.1	7.9	5.7	5.3	3.9	2.9	2.7
Market Capitalization of Listed Companies (billion $)											
Indonesia	30.0	54.7	73.3	81.4	138.9	211.7	98.8	178.2	360.4	390.1	396.8
Malaysia	123.9	168.4	190.0	181.2	235.4	325.7	187.1	256.0	410.5	395.1	476.3
Philippines	39.0	23.6	28.9	40.2	68.4	103.2	52.1	80.1	157.3	165.4	264.1
Singapore	101.9	229.3	277.0	316.7	276.3	353.5	180.0	310.8	370.1	308.3	414.1
Thailand	46.2	121.2	116.7	124.9	141.1	196.0	102.6	138.2	277.7	268.5	383.0

Source: The World Bank. Retrieved October 3, 2013 from: http://databank.worldbank.org

The economic growth in ASEAN countries has developed very well relative to other developing regions. As can be seen from Figure 2.2, the growth in GDP shows a positive sign aftermath the Asian crisis, and the sign continuously increased till the year 2007. In 2008, the growth decreased due to the eruption of the U.S. subprime crisis. It shows that the growth rates of the ASEAN member countries have become increasingly correlated with each other since the Asian crisis especially in the intra-industry trade. The product fragmentation is one of the intra-industry trade that cause the development of multinational activities in ASEAN (Rana, 2006). In fact, the intra-ASEAN trade reached its highest share nearly at 27.0 percent but it dropped back in 2009. At the same time, the ASEAN's shares with each of its top partners (Japan, EU, China and the United States) also decline due to the global economic downturn. These crises has reduced both the absolute and relative demand from ASEAN's major partners, cause the global production networks damage, and affect the intra-regional trade (Plummer and Chia, 2009). Consequently, the global financial architecture as a whole must be

revamped to improve the regulation and supervision of financial institutions. This is to enable early preventive measures to be taken to prevent the crisis that led to the downfall of any bank or financial institution that in turn may affect the stability of the world financial system.



Source: IMF, World Economic Outlook Database.

Figure 2.2: GDP Growth (percentage) of ASEAN (1989 to 2009)

As reported by the IMF (2010), the economic growth in emerging and developing economies is expected to be over 6.2 percent during 2010–2011, compared to 2.5 percent in 2009[2]. Among the developing countries, the ASEAN countries have been growing rapidly and among the fastest growing countries. In the past thirty years, the five ASEAN countries have undergone profound transformations and have grown faster than other regions in the world, excluding the high-performing North-East Asian economies. Besides, each country has experienced substantial industrial diversification and fast economic growth due to the adoption of export-oriented trade policies, the rapid flow of foreign direct investment, and sound macroeconomic policies. Selected indicators for the five ASEAN countries in 2011 is shown in Table 2.3. The economic growth of five ASEAN countries in 2011 shows that Singapore was the highest-income

[2] International Monetary Fund (IMF), 2010.

country and have no external debt, with the growth in GDP per capita of 2.7 percent. Although Indonesia is classified as a lower-income country, it has the highest GDP per capita by 5.4 percent compared to Singapore. The sources of rapid and sustained in economic growth, and characteristics that are shared among the five ASEAN countries is caused by outward orientation, such as trade openess and foreign direct investment. Moreover, human capital investment is also regarded as the main factors contributing to the rapid growth in this region. In addition, foreign trade also promote the dissemination of new products and new technologies, while international investment brings technological improvements (Lim and McAleer, 2004).

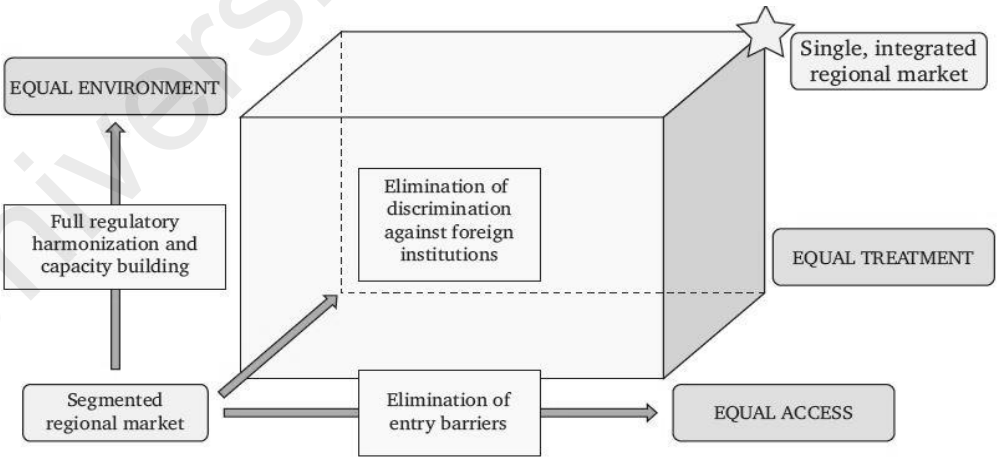
Table 2.3: Selected Indicators of five ASEAN Countries in 2011

Indicators	Indonesia	Malaysia	Philippines	Singapore	Thailand
Land area (sq. km)	1,811,570	328,550	298,170	700	510,890
Population (millions)	242.3	28.8	94.8	5.1	69.5
Population growth (%)	1.0	1.6	1.7	2.1	0.6
GDP growth (annual %)	6.5	5.1	3.9	4.9	0.1
GDP per capita growth (%)	5.4	3.4	2.2	2.7	-0.5
Exports ($ billions)	144.9	169.5	62.5	416.9	146.1
Imports ($ billions)	111.8	157.2	65.4	357.9	130.9
External debt ($ billions)	38.2	43.7	7.01	nil	44.9
Inflation (annual %)	5.4	3.2	4.6	5.3	3.8

Sources: The World Bank.

2.3 The ASEAN Banking Framework

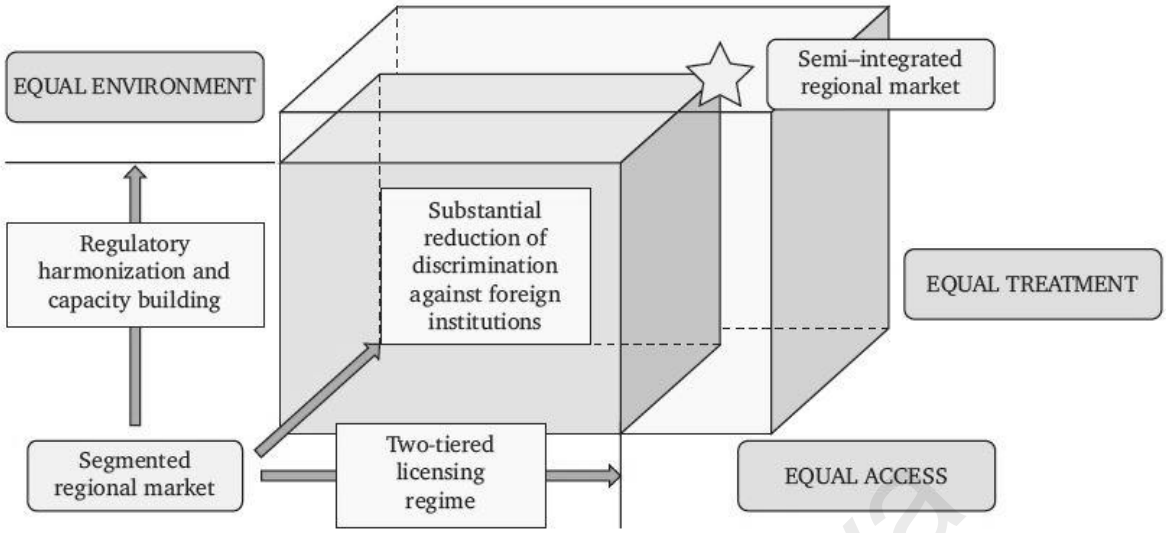
The ASEAN banking framework is designed to enable ASEAN banks to enter and operate in banking markets in other ASEAN member states, to eliminate discrimination against foreign banks, and to create a more consistent banking environment throughout the region. The framework presents a plan for liberalization in each of the three dimensions of the single market presented in Figure 2.3. Figure 2.4 suggests that the target to be achieved by 2020 is not a fully integrated regional market but a semi-integrated one. To achieve significant progress by 2020, compromises must be made. First, only a small number of high−quality banks that meet specific qualifications will gain access to the banking markets in all member states. Second, some within-market restrictions that may hinder free cross‐border expansion will remain at the discretion of the host member state. Third, progress in the sub-dimension of regulatory harmonization will be slow, except in several key areas such as the criteria for prompt corrective action (PCA)[3].



Source: Asian Development Bank regional technical assistance project Combined Studies on Assessing the Financial Landscape and Formulating Milestones for Monetary and Financial Integration in the Association of Southeast Asian Nations (ASEAN).

Figure 2.3: Three Dimensions of the Single Market

[3] Prompt Corrective Action is a US federal law mandating progressive penalties against banks that exhibit progressively deteriorating capital ratios.



Source: Asian Development Bank regional technical assistance project Combined Studies on Assessing the Financial Landscape and Formulating Milestones for Monetary and Financial Integration in the Association of Southeast Asian Nations (ASEAN).

Figure 2.4: The ASEAN Banking Framework

2.3.1 Equal Access

(i) Entry

To promote the active penetration of the regional banking market by ASEAN-based banks, member countries must first agree on the terms of the ASEAN-based banks. The terms are: (i) capital adequacy requirements, (ii) consolidation requirements and authority for consolidated supervision, (iii) restrictions on large exposure, and (iv) accounting and transparency requirements. The ASEAN-based banks that satisfy all such qualifications are referred as qualified ASEAN banks (QABs). The member states should agree to facilitate QAB access to their respective domestic banking markets. The qualification set for QAB will serve as a benchmark for regulatory adjustments in the banking industry to accelerate the integration of the banking market in the region. The stated qualifications may also be the target of operations for other banks in the region to enhance their financial strength and operational efficiency, thereby accelerating the development of banking market in the region

(ii) Cross-Border Banking

The proposed entry liberalization plan is mainly centered on commercial banks. Given the differences in the nature of business between wholesale and retail banking, it is only reasonable to liberalize wholesale banking. The liberalization of market access should be implemented appropriately for market entry and cross-border banking activities. This means that QABs should be allowed to provide cross-border banking activities, which are subject to the relevant types of banking licensing category granted by the host country. In allowing ASEAN-based banks to participate actively in domestic banking markets, regulators must take into account the intended activities of each bank and its capacity to manage the risks to which it is exposed. The process of granting equal treatment to all banks, specifically in the matter of regulatory supervision, should be based on their risk profile.

2.3.2 Equal Environment

(i) Harmonization of Banking Regulations

Although the requirements during the early stages of banking market integration is based on Qualified Asean Bank (QAB) qualification, the regional integration of the banking market should be consistent and meet the following key requirements: (i) bank accounting standards and disclosure requirements, (ii) minimum capital requirements, (iii) risk management, (iv) PCA and resolution methods for failed banks, (v) restrictions on large exposure, and (vi) anti-money laundering and consumer protection regulations. The prudential requirements for banks must be harmonized to prevent potential conflicts among national supervisors. Those requirements include: (i) minimum PCA triggers, (ii) accounting practices and disclosure requirements to ensure adequate transparency, (iii) asset and liability management restrictions to prevent regulatory arbitrage, and (iv) risk management regulations. However, national authorities are not precluded from seeking higher standards that are appropriate to their national context.

(ii) Institution Building

In a few member states with less developed banking markets or inadequate financial infrastructure, priority should be given to capacity building. For example, national credit rating agencies, credit guarantee facilities, and interbank lending and borrowing markets must be established before a country can begin in earnest to ease entry barriers. This suggests that a uniform timeline cannot be imposed on all member states, and that the liberalization of banking services should depend on the progress made in the development of the individual countries' banking market and other financial infrastructure.

It is worth emphasizing the importance of joint efforts among member countries to create a consistent banking environment in the region. Joint ventures are not considered to mean that all member states are expected to contribute equally. Members of the country who are left behind in the development of the domestic banking market may be difficult to set up critical infrastructure in time for the immediate integration of the regional banking market. In such cases, assistance and cooperation of other member states will significantly improve the condition of the state's member.

2.4 The Role of Commercial Banks and Bank Lending

The primary role of a commercial bank is to act as a financial intermediary, by mobilizing and allocating resources, through deposit taking and lending. Recently, the scope of bank activities has developed to cover a wider range of financial services, including investment banking and fund management. In much of Southeast Asia, bank perform an important role as domestic lenders, as evidenced by the size of loans to the gross domestic product (GDP) in the ASEAN-5 economies (Table 2.4). However, the size of bank loans has tended to decline since the Asian financial crisis. Malaysia and Singapore have actively tapped the bond and equity markets in the late 1990s. There is an increasing trend of bond financing in Malaysia, Singapore and Thailand, and of equity market financing in the Philippines. Yet the capital markets of the ASEAN-5 economies, except Singapore, are not well-developed. Most of the region's stock market is characterized by poor transparency, low liquidity, thin trading, high volatility, and underdevelopment market infrastructure (Asian Development Bank, 2000). Meanwhile, the corporate bonds markets are relative small and largely underdeveloped (Yoshitomi and Shirai, 2001).

Besides domestic borrowing, larger Thai corporations are able to borrow directly from foreign banks in the offshore market. Meanwhile small- and medium-size enterprises (SME) in Thailand rely heavily on domestic bank credit. In Indonesia, if banks are not owned by the government, they are commonly owned by large business groups, or politicians, or both. A bank owned by a group usually provides credit to the companies in the same group (ADB, 2000). In the Philippines, most creditors are domestic commercial banks. Half of domestic commercial banks are linked through ownership to the non-financial business groups. In contrast, only a few commercial banks in Malaysia are part of conglomerates (ADB, 2000). Although Singapore has a large offshore market, regulations have prevented corporations from borrowing offshore

in domestic currency. Given Singapore's ample savings and low interest rates, offshore foreign currency borrowing by corporations remains very small. In Southeast Asia, Malaysia and Singapore corporations have tended to rely more on bond and equity financing (Dekle and Kletzer, 2002).

Table 2.4: ASEAN-5 Bank Loans, Bonds, and Equities, as a Percentage of GDP

Year	Bank Loans	Bonds	Equity Market Capitalization
Indonesia			
1996	55.0	1.8	40.6
1997	60.2	2.5	25.6
1998	51.0	1.5	18.4
1999	20.3	1.4	40.7
2000	20.8	1.7	20.1
Malaysia			
1996	90.0	46.9	317.1
1997	102.8	47.3	133.4
1998	109.2	49.0	132.2
1999	108.0	57.3	184.0
2000	101.4	62.1	130.4
Philippines			
1996	51.6	0.3	97.7
1997	58.4	0.2	51.6
1998	50.3	0.6	51.3
1999	45.5	0.9	65.1
2000	44.0	1.1	78.1
Singapore			
1996	99.1	20.2	201.5
1997	102.2	22.1	229.9
1998	110.3	23.3	173.5
1999	103.6	30.3	298.1
2000	96.6	31.1	252.9
Thailand			
1996	105.0	11.2	53.1
1997	127.8	11.5	23.1
1998	113.2	20.3	26.8
1999	111.2	30.1	43.8
2000	94.2	33.4	26.2

Source: CEIC Database

2.5 The Asian Financial Crisis and Global Financial Crisis

The Asian crisis *inter alia* took a heavy toll on the financial sector of the crisis-affected countries and the region. Asia was a favored region for capital flows from the global financial markets before the crisis. During 1995 and 1996, net capital inflows into the region were approximately 6.3 percent of GDP and 5.8 percent of GDP, respectively. Credit expansion in many Asian economies was indiscriminate, lending to dubious quality loans. Misallocation resulted in a decline in the rate of return on capital and with that, growth rates suffered. A decade after the Asian crisis, Asian economies were much more resilient (Burton and Zanello, 2007). In particular, discernible improvements in the macroeconomic financial frameworks in the Asian emerging market economies enabled them to cushion the effect of unprecedented external shock that they received in 2007 and 2008 (IMF, 2010, p. 3). In addition, the crisis was a learning experience and helped Asian economies abandon macroeconomic management strategies that were not sound.

2.5.1 The Asian Financial Crisis of 1997

It is generally accepted that what happened in Asia before Asian financial crisis was the influx of foreign capital that resulted in misallocation of capital, mismatch of short-term borrowings with long-term investments, aggravated by pegged exchange rates. In the early 1990s, interest rates in developed countries were low and investors were chasing for higher yields in the 'emerging markets' starting in Latin America and culminating in Southeast Asia. In 1990 private capital flows in emerging markets were $42 billion and by 1997, they reached $256 billion (Krugman, 2009, p.79). Most of these were short-term capital flows in the form of portfolio investments and other investments (loans and deposits) through the banking system.

Faced with huge capital inflows, it is almost inevitable that much went into speculative investments in the stock and property markets, or ended up in financial

unviable projects. In the heyday of the bank syndicated loans, both foreign and local banks were lending more than what was required of financially viable. Lenders and borrowers had over-optimistic financial projections at best, or engaged in fraud and financial mismanagement at worst. The results were asset bubbles and over-leveraged corporations with foreign currency loans that imploded when sudden massive reversal of capital flows caused huge depreciation in the borrowers' currencies (Corden, 2007).

The Asian financial crisis was not the boom and burst of a normal business cycle but one associated with speculative and erratic financial flows. The current account deficits in many countries before the Asian financial crisis were not result of low savings rates. In fact, savings rates remained steady and high by global standards. The negative savings-investment gaps widened as a result of rising private investments funded by an abundance of cheap foreign private capital. In 1996, five Asian countries, South Korea, Indonesia, Malaysia, the Philippines and Thailand, received net private capital inflows of $93 billion. A year later they experienced an outflow of $12 billion, a turnaround of $105 billion, amounting to more than 10 percent of their combined GDP (Rodrik, 1998). No country can sustain this magnitude of financial reversal without a crisis. In a matter of months the financial contagion spread throughout Asia and brought many economies to the recessions. Real GDP in 1998 fell by 13 percent in Indonesia, 11 percent in Thailand, 7 percent in South Korea, 7 percent in Malaysia, 5 percent in Hong Kong, 1 percent in Japan and 0.8 percent in Singapore (Lee and McKibbin, 2007). It is instructive to note that two countries that did not fully open up their economies to capital flows, for example India and China were spared the ravages of the Asian financial crisis.

The lessons that Asian countries learn from the Asian financial crisis were, the governments had little choice but to bailout the financial systems through takeover of bad banks, wide scale restructuring of bad loans with government participation, and

reforms in the financial sector and legal systems. The fiscal costs of bailouts in these countries, as a percentage of GDP, ranged from a high of 55 percent in Indonesia to 13 percent in the Philippines. See Table 2.5.

Table 2.5: Cost of Banking Crisis during Asian Financial Crisis

Countries	Fiscal Cost (% of GDP)	Output Loss (% of GDP)	Non-Performing Loans at Peak (% of Total Loans)
Indonesia	55	39	70
Malaysia	16	33	30
Philippines	13	10	20
Thailand	35	40	33

Source: Caprio et al. (2003)

Table 2.6 shows that these countries have since cleaned up their non-performing loans, introduced legal and banking reforms, improved financial regulation and supervision, and strengthened capital adequacy ratios. One important lesson learned was for corporations to reduce leverage and to minimize currency mismatch of their debt. Between 1996/97 and 2006/07, corporate balance sheets of these countries become healthier with corporate debt to equity ratios declining significantly; from 41 percent to 13 percent for the Philippines, and 119 percent to 46 percent for Indonesia. Also, a favorable global economic environment, after the 2000 dotcom crisis, boosted exports and Asian economies rebounded in terms of output levels, but the growth rates of real output is still lower than the pre-crisis levels. Table 2.7 shows healthy improvement in macroeconomic indicators for ASEAN-5 countries between 1997 and 2007. Current account balances turned from deficits to surpluses, foreign reserves raised dramatically, external debt ratio improved, and fiscal deficits are low.

Table 2.6: Selected Financial Indicators for ASEAN-5

	Non-Performing Loans/Total Loans		Risk Weighted Capital Adequacy		Loan to Deposit		Debt/Equity	
Percent	1999	2007/08	1999	2007/08	1996/97	2006/07	1996/97	2006/07
Indonesia	33	9	7	21	105	63	119	46
Malaysia	17	7	13	13	96	71	49	32
Philippines	15	6	18	16	99	59	41	13
Singapore	5	2	21	14	111	74	48	28
Thailand	39	8	12	15	136	91	117	39

Source: ADB (2008) Table 3; MAS (2008)

Table 2.7: Selected Economic Indicators for ASEAN-5 in Percentage of GDP

Country	Current Account Balance (Percent)		Foreign Reserves ($ Billion)		External Debt (Percent)		Fiscal Balance (Percent)	
	1997	2007	1997	2007	1996/97	2006/07	1996/97	2006/07
Indonesia	-2.3	2.4	16.6	55.0	51.0	33.0	0.0	-1.0
Malaysia	-5.9	15.5	20.8	101.0	40.0	32.0	2.0	-3.0
Philippines	-5.3	4.9	7.3	30.2	49.0	4.0	0.0	-1.0
Singapore	15.6	23.4	71.4	163.0	NA	NA	0.0	-1.0
Thailand	-8.1	5.7	26.2	85	66.0	27.0	3.0	1.0

Sources: MAS (2008), Table C-1; IFS (various issues)

2.5.2 The Global Financial Crisis of 2008

Despite healthier macroeconomic fundamentals and minimal exposure of domestic Asian banks to toxic assets related to the U.S. subprime market, emerging Asian economies were hit hard by the global financial crisis because of their closer integration into global finance and trade.

At the peak of the global financial crisis, credit spread hikes were observed during the last quarter of 2008. Stock markets in Asia declined more compared to those in G2 countries. Between the end of 2007 and beginning of 2009, while Dow Jones index and UK FTSE fell by 34.1 percent and 30.2 percent respectively, Japan Nikkei fell by 42 percent, Shanghai Composite by 64.3 percent, and Korea KOSPI 36.4 percent. Asian stock markets fell as foreign funds withdrew to cover for losses suffered in the United States. In the same period Asian currencies depreciated but not as sharply as during the Asian financial crisis. Except for the yen and the reminbi that appreciated by 18.7 percent and 6.6 percent respectively, others like Korean won depreciated by 34.9

percent, the India rupee by 23.7 percent, the Thai baht by 3.5 percent, and the Taiwan dollar by 1.3 percent. The Korean won was hit hardest because of its disproportionate exposure to foreign portfolio investments. Korean external debt swelled to $ 425.1 billion in the second quarter of 2008 and its loan-to-deposit ratio of 140 percent in the banking sector outstripped other countries in the region. Depreciation of the won would have been worse if not for government bailout that was possible during this crisis because of its sizeable foreign reserves built up after the Asian financial crisis.

In the real economy, Asia saw the greatest collapse of its export markets due to a sharp decline in imports of goods and services by the developed economies. The main reasons were the credit crunch that affected investments and trade, and the negative wealth effect on consumption from losses suffered in the financial meltdown. In January 2009, large decline in exports were observed, ranging from 40 percent year-on-year for Taiwan and the Philippines, around 35 percent for Indonesia, Singapore and Korea, and about 25 percent for Malaysia, Thailand and Hong Kong. Only China registered a less than 20 percent decline in exports (World Bank, 2009, p.13).

The latest statistical data shows the ASEAN economy that facing a deep recession during the global financial crisis has shown recovery in the late-2009. The recovery began in the late-2009 for ASEAN countries or at the latest in early 2010 in other countries. In 2010, the ASEAN-5 economic growth for the first quarter reached 16.9 percent in Singapore, 12.0 percent in Thailand, 10.1 percent in Malaysia, 7.3 percent in the Philippines and 5.7 percent in Indonesia. It's important to realize that the ASEAN countries indeed have a very strong recovery in overcoming the global financial crisis. This development can be attributed into two factors. The first factor is, an immediate and significant stimulus programs undertaken by the government to overcome the global crisis. The second is, precautionary measures taken by the government to strengthen the banking system and the financial sector. The ASEAN countries have also

benefited from the resilience of China economy, which have performed extremely well during the global recession. For this reason, the ASEAN countries do not suffer from a severe recession and began to show rapid growth in early 2010. Economic integration among ASEAN countries is indispensable to tackle the financial crisis and uncertainty in the global economy. By all means, this region should redouble its efforts to pursue mutually-beneficial free-trade agreements and regional cooperation to stimulate demand and promote economic development.

Table 2.8 presents the GDP growth in five ASEAN countries, 2002-2012. As seen in Table 2.8, the effect of the global financial crisis on the Indonesian economy is very limited. The sign of downturn in economic growth began to appear as early as the fourth quarter of 2008. Even so, the Indonesian economic growth as a whole still managed to reach 6.2 percent in 2012, and this growth was considered the highest in Asia. The reason behind the good performance of the Indonesian economy is due to the huge domestic demand. The huge domestic demand was able to insulate the economy from the ravages of the global recession. Indonesia has increases its domestic demand in GDP to the high of 97.0 percent in 2008 from 88.0 percent in 2000. Unlike the other governments in Southeast Asia, the Indonesian Government did not face the necessity of implementing massive stimulus packages. Even so, the economy continued to expand at a fairly healthy pace, chalking up a reasonable growth rate of 4.6 percent in 2009, just a slight dip from the 6.0 percent in the previous year. In fact, the government plans a fiscal stimulus package to maintain private consumption levels to cushion the effect of the global financial crisis. Policies to keep financial market stability are also being launched, particularly to keep inflationary pressures down and prevent depleted domestic purchasing power. As an open economy, Indonesia is obviously in no position to isolate itself from the fallout of slowing global economic activity. Indeed, domestic sector in Indonesia is demonstrably capable of generating economic momentum amid

the global crisis. In brief, lesson that can be learned from the current global crisis are: first, banks should concentrate on financing activities with identifiable underlying transactions and based on clear risk calculations. Second, the basic principles of conventional macro management are proven to be relevant in confronting the crisis.

As a highly open economy, Malaysia was, however, not insulated from the global economic downturn. At the first half of 2008, Malaysia was relatively unaffected by the financial turmoil. The financial and economic environment worsened in the second half of 2008 and first quarter of 2009. GDP growth slowed down to 0.1 percent in the last quarter of 2008, and decelerated by -6.2 percent and -3.9 percent respectively in the first two quarters of 2009. The depressing performance in the first quarter of 2009 confirmed the expectation that Malaysia faces a full-blown recession for the year 2009. The decline was mainly due to the drastic contraction in export value of 27.9 percent year-on-year in January 2009. The fall in exports affected the growth of the manufacturing sector by 19.1 percent in the first quarter of 2009 (Bank Negara Malaysia, 2009). Like other countries, to counter the recession, the Malaysian government introduced stimulus packages to revive the economy. On 4 November 2008, the government announced the first economic stimulus package, which amounted to RM7 billion. The global trade slowdown and the sharp plunge in trade in January 2009 prompted the government to introduce a second stimulus package that was bigger and more comprehensive, totaling RM20 billion, in March 2009. This makes Malaysia the second most aggressive in its "policy-induced recovery" programmes among the Asean countries after Singapore (CIMB, 2009). This crisis has also reinforced the importance of Malaysia's integration with the global economy. In a rapidly changing global economy, it is important that Malaysia maintains strong fundamentals and a robust financial sector. This will enable Malaysia to respond effectively to volatility in international markets while the domestic

resources available can be mobilized to mitigate the adverse effect of a worldwide crisis.

The Philippines did not experience global economic recession, but suffered a slowdown in economic growth. The GDP growth rate in 2008 fell to 4.2 percent, compared to 6.6 percent in 2007. However, the slowdown in the Philippine economic growth was not due to the global financial crisis. Rather, the deceleration in the Philippine economy was largely brought about by a surge in inflation triggered by the sharp rise in food and fuel prices. Inflation jumped to 9.3 percent in 2008 after averaging only 2.8 percent in 2007. The manufacturing sector contracted by the 29.2 percent in 2009. The manufacturing sector was able to offset the contraction in other sub-sectors, particularly electronics and furniture, in the first third quarters of 2008. The service trade sector shows surprising outcome. It contributes 17.0 percent to GDP and spared from effects of economic downturns. Personal consumption expenditure, the largest contributor to GDP growth, shows a downward trend from 5.8 percent in 2007 to 4.7 percent in 2008, and 3.7 percent in 2009. GDP growth during the first quarter of 2009 fell to 1.7 percent from 5.7 percent in the fourth of 2008. The crisis also affected trade balance in the Philippines. The fiscal deficit of the national government surged to 3.2 percent of GDP in 2009. The target set in July 2008 was 0.5 percent and this was subsequently changed to 1.0 percent in November 2008 in the wake of the crisis. The fiscal deficit in 2008 was only 0.9 percent of GDP. One reason that the deficit is expected to widen is due to the government reluctant to cut expenditures when the economy is slowing down considerably.

The economy of Singapore started to contract in late 2008 on account of its manufacturing, transport, logistic and external trade closely linked to global and regional trade flows. All these are reflected in the macroeconomic indicators, with real growth falling from 6.7 percent in the first quarter of 2008 to -4.1 percent in the last

quarter of 2008 on a year-on-year basis. Likewise the real growth rate for gross capital formation plummeted on a year-on-year basis from 30.0 percent in the first quarter of 2008 to -10.0 percent in the last quarter of 2008. The sharpest drop was in net exports growth, which fell from -27.0 percent to -50.0 percent over the same period. Similarly, private consumption and public consumption growth rates also fall, though less markedly at 0.9 percent respectively in the last quarter of 2008. In terms of absolute numbers, gross capital formation dropped from $17.9 billion to $15.4 billion between the first quarter and the last quarter of 2008, private consumption went up slightly from $22.5 billion to $22.8 billion, while public consumption declined from $9 billion to $5.9 billion. Given the depth of the economic crisis, the drop in public spending in 2008 was quite unexpected. However in the budget announcement for financial year 2009, Singapore Government introduced resilience package worth S$20.5 billion. The aims of the stimulus were to assist badly damaged companies to stay afloat and to save jobs in the midst of deteriorating employment condition. On the whole, the stimulus has succeeded in preventing a further worsening of recession. In fact, the effect of global financial crisis on Singapore was influenced not only by the sub-prime mortgages, but also by the failure of some proper supervision and regulation in the financial system.

The effect of the global financial crisis has cause a contraction in the Thai economy and loan growth. The economic slowdown led to a contraction in banking credit growth. The loan growth decreased from 11.4 percent at end 2008 to -3.1 percent at end September 2009. The corporate loans, which constitute 73.1 percent of total loans contracted by 6.5 percent due to the economic slowdown. In contrast, consumer loans continued to grow although decelerated somewhat to 7.3 percent. For the whole year of 2009, the Thai economy is expected to contract around 3.0 percent, after a sign of recovery in the third quarter with a contraction of 2.8 percent, still improved by far from a sharp contraction of 7.1 percent and 4.9 percent in the first and second quarter

respectively. Household consumption, private investment and exports continued to improve as a result of government economic stimulus programs and global economic recovery following the economic stimulus measures applying in most countries of the world. The Thai government has implemented two stimulus packages to tackle the global financial crisis. The first stimulus package was introduced in March 2009 to encourage more consumption and to mitigate the hardships of the people. In mid 2009, the Thai Government decided to introduce second stimulus package. This second package consists of 1.43 trillion baht for the three-year period 2010-2012 to be utilized to fund important infrastructure projects.

Table 2.8: GDP Growth in ASEAN Countries, 2002-2012

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
GDP growth (annual %)											
Indonesia	4.5	4.8	5.0	5.7	5.5	6.3	6.0	4.6	6.2	6.5	6.2
Malaysia	5.4	5.8	6.8	5.3	5.6	6.3	4.8	-1.5	7.2	5.1	5.6
Philippines	3.6	5.0	6.7	4.8	5.2	6.6	4.2	1.1	7.6	3.6	6.8
Singapore	4.2	4.6	9.2	7.4	8.6	9.0	1.7	-0.8	14.8	5.2	1.3
Thailand	5.3	7.1	6.3	4.6	5.1	5.0	2.5	-2.3	7.8	0.1	6.5

Source: The World Bank. Retrieved October 3, 2013 from: http://databank.worldbank.org

2.5.3 Preventing and Managing Financial Crisis

In view of the perceived need for better crisis prevention and management, the following areas of activity are highlighted.

First, for crisis prevention, governments need to better manage short-term capital flows and avoid the double mismatch (of currency and maturity), while adopting a managed floating exchange rate regime and measures to strengthen the banking sector as a total policy package. This could allow for better management of capital inflows. Recapitalizing the banking system, instituting prudential regulatory reform, and dealing with burden of non-performing loans in the region remain the most important financial challenge and priority facing developing Asia.

Second, for crisis management, "bailing in" the private sector and restricting the holding of domestic currencies by non-residents would help with better managing a sudden reversal of capital inflows. This calls for the adoption and effective implementation and enforcement of international best practices in prudential regulation and supervision, as well as disclosure requirements for banks and the corporate sector. Asian development bank (ADB) can assist governments in both debtor and creditor developing member countries in promoting and enforcing adequate practices and standards, and in collecting and disseminating economic and financial information on a timely basis.

Third, a viable regional arrangement needs to be in place both to monitor and disseminate information on economic policies, institutional developments, and financial architecture issues, and to provide capacity-building technical assistance to the ASEAN Secretariat. To this end, ADB has established a Regional Economic Monitoring Unit (REMU) and it is important that it gives attention to the ASEAN Surveillance Unit, established in Jakarta, which focuses on the need for timely monitoring of (and joint policy consultation on) development in light of the contagion effects evidence from the Asian financial crisis.

Fourth, the proposed Asian Monetary Fund (sometimes known as the Asian Support Fund) to provide a mechanism for emergency financial support might be reconsidered. The Fund's central role would be to mobilized very large amounts of resources at short notice, and play a key role in preventing future crises, mainly by helping strengthen financial sectors and conducting effective surveillance based on location advantage.

2.5.4 Policy Responses

The policy responses to the crisis called for coordinated action among members of the global economy to use aggressive monetary and fiscal policies to compensate for the collapse of private sector demand.[4] Obviously, countries that have stronger macroeconomic fundamentals have greater scope to pursue more aggressive monetary and fiscal policies. In terms of monetary policies, those that have lower inflation rates such as China, Japan and Thailand were able to pursue a more expansionary monetary policy without the fear of rising inflation, whereas Indonesia, the Philippines and Korea are more muted in monetary response because of inflationary concerns. As for fiscal stimulus, China put up the biggest package equivalent to 12 percent of its GDP, followed by Malaysia 9 percent, Singapore 8 percent, Korea 7 percent, all exceeding U.S. stimulus package as a percentage of GDP (World Bank, 2009).

A recent IMF report predicted that while the global economy will contract 1 percent in 2009 and grow at 3 percent in 2010 (IMF, 2009), emerging Asia will grow at 5 percent and 6.8 percent, with China growing at 8.5 percent, India 5.4 percent and Indonesia at 4 percent in 2009 (Ibid, p. 73-74). Other indicators are also doing well for Asia. For example, stock markets and housing markets have recovered strongly over the last quarter 2009, especially in China, Hong Kong and Singapore; inflation and unemployment is much milder than past recessions of Asian financial crisis.

[4] According to a recent IMF report, the world has pumped in $12 trillion of stimulus programmes to jump start the world's economy.

CHAPTER 3: LITERATURE REVIEW

3.1 Introduction

The empirical studies on stock market and economic growth are classified into four sections. The first section discusses the theoretical literature related to the stock market and economic growth. It discusses the relevant theories on growth literature. The second section discusses the empirical studies relating to stock market and economic growth. Then, the third section discusses the validation of research variables used in this study. This section discusses the relationship between: (i) Stock prices and economic growth, (ii) Money supply and economic growth, (iii) Interest rate and economic growth, (iv) Inflation and economic growth, (v) exchange rate and economic growth, and (vi) Crisis and economic growth. Finally, the end of the Chapter Three discusses the empirical studies related to stock market, bank, real estate and economic growth. This section extends the literature on stock market and economic growth by investigating three types of relationships. This section discusses the relationship between: (i) stock market and economic growth, (ii) bank and economic growth, and (iii) real estate and economic growth.

3.2 Theoretical Literature on Stock Market and Economic Growth

There are many theoretical literatures that emphasize the role played by financial markets particularly the stock market in promoting economic growth. The endogenous growth literature and theoretical studies have recently worked to provide a link between the literature of endogenous growth theory and financial markets. Gurley and Shaw (1955) were the first to study the relationship between financial markets and economic growth. Gurley and Shaw (1955) made a direct correlation between financial markets and real activity, recognizing that financial markets can widen borrowers' financial

capacity and improve the efficiency of inter-temporal trade and result in the pooling of investment. They found that financial markets contribute to economic development by increasing the accumulation of physical capital. Although the relationship between the financial markets and the economic growth experienced a lack of study prior to 1970 due to the limited data available during that period and no robust model to clarify the mechanisms in which financial markets affected economic growth. This remains until the economists begin to introduce a model that analyzes the financial markets and economic growth. For instance, Goldsmith (1969), McKinnon (1973) and Shaw (1973) found that the financial market development is positively and significantly correlated with economic growth. Goldsmith (1969) argues that when real income and wealth increase, this will further lead to the size of the financial markets growing well. Shaw (1973) and McKinnon (1973) on the other hand, were the first who emphasized the importance of the development of the financial sector, and then examines the effects of government intervention on the development of the financial sector. They found that financial intermediation has a positive effect on the steady state growth (as outlined by Greenwood and Jovanovic , 1990; Bencivenga and Smith, 1991; Greenwald and Stiglitz, 1986; Saint-Paul, 1992; Boyd and Smith, 1998; Levine, 1997; Pagano, 1992) and government intervention has a negative effect on growth in the financial sector.

Bencivenga and Smith (1991) and Levine (1991) were the first to propose "endogenous growth" framework models to identify the channels through which financial markets affect long term economic growth. Their studies emphasized that financial markets will help to diversify an agent's liquidity risk and capital accumulation to attract more savings into productive investment and prevent the early removal of physical capital invested in long-term projects. Within the existence of financial markets there will be more capital intended to use in productive investments. In the same vein, Greenwood and Jovanovic (1990) contend that financial

intermediation increases productivity of real capital, which in turn enables the development of more complex financial structures allowing for the supply of more financial services with less use of real resources. These could increase the productivity of real capital and further enhances economic growth.

In Greenwald and Stiglitz's (1986) theoretical model, they examine how the company's productivity growth is affected by imperfections in the financial market. This model highlights the company's failure to sell equity securities, which can influence the company to diversify the risk of real investment. They contend that stock market failures restrict the company's ability to diversify the operating risk, thereby reducing the level of operations as another method of risk management. The findings of the study demonstrate that stock market imperfections will have a negative effect on productivity growth rates due to reduced company training and other directives, as well as direct investment in productivity improvements.

Boyd and Smith (1998) present a framework in which both debt and equity markets effect the level of economic growth. They investigate the economy where investments are made by a group of agents who need external funding, and where their financial decision depend on the amount of information required by investors to monitoring the management. His study suggests two types of technologies available to investors. First, yields of return that can only freely observe by start-up investor (debt), and second, yields of return which is publicly observable (equity). The conclusion is, when the economy goes along the growth path and accumulates capital, the relative price of capital will decline, and as a result, the economy will grows and monitoring costs will increase. As such, investors will tend to use capital-intensive technology that can be seen as more intensively to the economy growth. This in turn will increase the volume of equity market activities and hence decrease in debt or equity ratio. Boyd and Smith analysis shows that there is a bilateral relationship between stock market development

and economic growth, and also in the banking sector and stock market. They explain that both the stock market and the bank are necessary in promoting economic growth. Therefore, they consider the stock market as a complement to the bank and not a substitute.

In the model of Saint-Paul (1992), the key factor that drives economic growth is the possibility of portfolio diversification through the stock market. This model shows that if financial intermediation is absent, investors will choose the technologies which are more productive, although riskier. He pointed out that investors could increase their productivity by specialization, though this could lead to higher risk due to the greater division of labour is needed to increase productivity growth. Thus, an increase in specialization of technology can be achieved if agents reduce risk through investment diversification, which may be possibly made by stock market development.

Levine (1991) has made the most significant contribution to the theoretical literature of stock market development and economic growth. In order to explain the part that financial market development plays in economic growth, Levine constructs an endogenous growth model in which the stock market seem to provide risk, and explore how the market transforms investment incentives that alter the rate of steady-state growth. In the Levine model, the stock market raises growth rates by increasing the productivity of the company or by expanding resource allocation. The stock market increases the efficiency of the company, through physical capital investment, as they rid the premature liquidation of company capital. As a result, more capital is deposited in companies that increase the rate of physical capital accumulation. The stock market influence growth by increasing the resource level allocated to the company. By allowing the companies to diversify productivity risk, the stock market drives risk-averse agents to invest more in companies. Stock market also minimizes the liquidity risks associated with the investment of the companies when agents that receive liquidity shocks sell their

shares more than the liquidation value of the company price. In addition, by increasing the company's efficiency, the stock market also increase the company's return on investment. Hence, the existence of stock markets in productivity management and liquidity risks accelerate economic growth by attracting resources on their most productive use.

3.3 Empirical Studies on Stock Market and Economic Growth

Economists have long debated the role of the financial sector in economic growth. For instance, Lucas (1988, p.6) asserts that "economists badly over-stress the role of financial factors in economic growth". He dismisses that finance is an 'over-stressed' determinant of economic growth. At the other extreme, Robinson (1952) states that "where enterprise leads finance follows" (p. 86), which reinterpreted that finance responds to demands from the non-financial sector and it does not cause economic growth. As put forth by Miller (1998, p.14), the idea that financial markets contribute to economic growth "is a proposition too obvious for serious discussion". In the same vein, Walter (1873) rejected the idea that the link between finance and economic growth can be safely ignored without substantially limiting the understanding of economic growth.

The empirical studies on finance and growth aimed at testing the conflicting views on the stock market and economic growth can be classified into three studies. First, the cross-sectional studies that represent this stream of work are Goldsmith (1969), King and Levine (1993b), Jayaratne and Strahan (1996), Levine and Zervos (1998), Levine et al. (2000). The results from their studies showed that the financial development is statistically significant and have a positive effect on growth. According to their findings, the level of financial development seems to be a good predictor of future economic growth. In contrast, Rousseau and Wachtel (2011) argued that the effect of financial deepening has weakened the economic growth

since the excessive liberalization of financial markets occurred in the late 1980s and early 1990s which has accompanied by financial crises. Financial deepening refers to the increase in the supply of financial assets in the economy. According to Ndebbio (2004, p. 1), it is important to note that if the increase in the supply of financial assets is small, this means that financial deepening in the economy is most likely to be shallow; but if the ratio is large, it means that financial deepening is likely to be high. He contends that, if the developed economies are characterized by high financial deepening, it means that the financial sector in those countries has significant growth and improvement, which in turn, led to the growth and development of the entire economy. This cross-section approach of growth regression fails to explicitly address the biases induced by the existence of cross-country heterogeneity and the endogeneity of the explanatory variables, thus leading to inconsistent results. Therefore, cross-section analysis cannot account for the potential stationarity of the data, and fails to properly examine the direction of causality. Positive relationship between finance and growth is not necessarily supported by the supply-leading views. It might be consistent either with the demand-leading or bi-directional causality assumptions (Caselli et al., 1996).

Secondly, evidence from time series analysis shows mixed results. Recent studies have also failed to document evidence that the financial system leads to economic growth. For instance, Al-Yousif (2002), Kar et al. (2011), Ellahi and Khan (2011) found weak evidence in explaining the effects of financial development on growth. Following with the same conclusion, Handa and Shubha (2008), İnce (2011), Sassi (2011), Al-Malkawi et al. (2012) found that the financial development contributes negatively to economic growth. In a study based on India, Mitra et al. (2007) found that causality running from finance to growth was weak. In contrast to the evidence reported by Habibullah and Eng (2006), Amiruddin et al. (2007), Islam and Osman

(2011), all supported the leading-supply and mutual dependence hypothesis in the case of developing countries. They concluded that financial development positively and significantly influences economic growth in the short-run and long-run.

The third study examines finance and growth by means of panel cointegration techniques. These approaches exploit the cross-section and the time series data. In a study of forty-one countries, Xu (2000) employ a VAR approach to examine the effects of permanent financial development on domestic investment and output. The findings indicate that financial development is important for long-run growth. Christopoulos and Tsionas (2004) used the panel unit root tests and panel cointegration analyses to examine the relationship between financial development and economic growth in ten developing countries. They find strong evidence in favor of the hypothesis that long-run causality runs from financial development to growth and there is no evidence of bi-directional causality. Conversely, Hakeem (2010) and Menyah et al. (2014) has employed a panel data framework finds that financial development has no strong effect on growth. Since their study does not incorporate channels through which financial development may influence growth, thus, it might have accounted for contradictory results.

Presently, recent studies have also documented evidence that the financial system leads to economic growth. In a panel data study based on 31 Chinese provinces, Hasan et al. (2009) used the GMM estimator and found that the development of financial markets promoted economic growth at the provincial level. Similar findings were reported by Zhang et al. (2012) for a data set consisting of 286 Chinese cities over the 2001–2006 periods. Bittencourt (2012) uses time series and panel data models to estimate the relationship between financial development and economic growth for four Latin American countries. He finds strong evidence that financial development contributes to economic growth. Furthermore, Campos et al. (2012)

find that financial development contributes to economic growth in Argentina. However, Ang and McKibbin (2007) argued that comparative analyses conducted at the aggregate level are unable to account for the complexity of the financial environment and specific institutional context of each individual country.

Available evidence suggests that the well-functioning financial system plays important role in promoting economic growth and economies in the long-term period (Levine, 2005; Demirguc-Kunt and Levine, 2008). However, the recent financial crises and the collapse of many large corporations are suggestive of the existence of asymmetric information especially in the financial sector. The role of stock market and economic growth is still inconclusive and in depth study is needed especially in the developing countries. The central debate of study is whether the growth of the financial sector that drives the growth of the real sector or whether it is the growth of the real sector that leads the development of the financial sector (Odhiambo, 2008). It is important to note that most of the studies on stock market and economic growth based on evidence from developed countries, mainly the United States and European countries. Evidence from developing countries is scarce. It is time to give more attention to developing countries as the economies have become more important after World War II (Nafziger, 1997). The structural transformation in the economy of developing countries has changed the economies significantly. Developing countries, particularly the ASEAN (Association of South East Asian Nation) countries, have increased market openness and become more dynamic as external trade increased. The financial sector has expanded rapidly and strongly to cope the fast changing economy. It is interesting to find out whether the respective countries have similar effect of stock markets on economic growth within a certain time period. Perceiving the importance of determining the influences of economic factors on stock market, a variety of empirical work have been executed to understand the link between stock

market and economic growth. This study examines the effects of financial and non-financial sector stock index on growth and links the effect of Asian and global financial crisis in ASEAN-5 countries.

3.4 Validation of Research Variables

To validate the reliability of the variables selected, the following section concisely evaluates the recent findings of interactions between each variable and economic growth grounded by both theory and empirical research.

3.4.1 Stock Prices and Economic Growth

The relationship between stock market and economic growth has been the focus of an immense body of theoretical and empirical research since the seminal work Goldsmith (1969). Goldsmith (1969) was the first one who assessed the positive relationship between stock market and economic growth. The positive relationship between economic growth and stock prices through corporate profitability has been well recognized in both theory and practice. To measure the real total output of goods and services in one economy, the real gross domestic product (GDP) is most commonly employed, after adjusting the nominal GDP by the price index (i.e. inflation rate).

In particular, when real economic activity goes up in a boom period, corporations have more opportunities to expand their profits, increasing expected cash flows, hence, raising investors' confidence in the stock market, and also raising stock prices. Conversely, in periods of recession, the downgrade of real economic output may negatively affect corporate profitability, resulting in decreasing stock prices.

Empirical research has shown strong support for this proposition between stock market and economic growth (Rousseau and Wachtel, 2000; Hassapis and Kalyvitis , 2002; Caporale et al., 2004; Liu and Sinclair, 2008; Cooray, 2010; Kim and Lin, 2013;

Pradhan et al., 2013). Thus, the literature almost seems to show conclusive evidence of a link between stock market and economic growth.

There are two ways to measure the economic growth of a country, the gross domestic product (GDP) and industrial production index (IPI). IPI data is always available in higher frequencies i.e. monthly, while GDP data is usually published on quarterly and annual basis. In the context of this study, quarterly GDP is used as a measurement of growth. This is because GDP covers wider economic production and not just industrial production. This study uses GDP at 2000 base-year price as a proxy for real GDP. The GDP at base-year price is a real GDP adjusted for price changes. The real GDP that account for changes in the price level provides a more accurate figure of economic activity.

3.4.2 Money Supply and Economic Growth

The links from money supply to economic growth in the context of mainstream macroeconomic theory explained that the increase in money supply will fully absorbed by the price level in the long-run. The classical economist, Irving Fisher had developed a study on the relationship between money supply and the general price level. His works is widely known as the 'quantity theory of money' where he produces a famous 'Fisher's equation'. The theory explained that any changes in the money supply in economy will produce the same rate changes in the general price level. In other words, the change in the money supply and the rate of inflation is proportionately positively related. However, when the general price level increases, it indicates the problem of inflation and makes the value of money decreases. To combat the problem of inflation, a contractionary monetary policy should be implemented as it can boost the aggregate demand in the economy. The tools of monetary policy to control inflation including increase discount rate, increase interest rate, selling government securities in open market operation, increase required reserve ratio, increase special deposits by

commercial banks and hire purchase regulations. Generally, higher interest rate on loans given to the customers by the commercial banks will increase the cost of investment, reduce the spending and reduces money supply in the economy. Henceforth, this will also decrease the real output in the economy.

The influence of money supply changes on economic growth has been broadly examined in the prior studies. Bednarik (2010) applied the simple principle of the quantity theory of money to propose a significant relationship between money supply and economic growth. This was followed by numerous supportive results from (Zapodeanu and Cociuba, 2010; Ihsan and Anjum, 2013; Chaitip et al., 2015), those all mainly focus on the developed and developing countries. Nonetheless, monetarists believe that an increase in the money supply will not affect to output or gross domestic product, but money supply will affect mainly on inflation. Fama (1981) argued that any surge in money supply might lead to inflation, raise risk premium and then decrease stock prices. Also expanding from the pure linkage between monetary growth and stock market with the presence of inflation, Wongbangpo and Sharma (2002) asserted that stock prices could be influenced by money supply through portfolio substitution or inflationary expectations. However, they found various results for five ASEAN countries over the period 1985-1996, caused by different levels of inflation within specified economies. Particularly, money growth negatively influenced on stock indices in Indonesia and Philippines as a result of the high level of inflation during the observed time period, whilst positively influencing stock price indices in Malaysia, Singapore and Thailand.

The broad money (M3) is used in this study. The M3 reflects more on the motive of saving and hence, has more a passive role in the economy. It acts more as a store of value rather than for transactions. By definition, M3 includes currency and coins, and deposits in checking accounts, savings accounts and small time deposits, overnight

repos at commercial banks, and non-institutional money market accounts. This is the main measure of the money supply.

3.4.3 Interest Rates and Economic Growth

The liquidity preference theory developed by John Maynard Keynes is an alternative approach to the determination of interest rate in the economy. According to the liquidity preference theory, the interest rate should be reduced to eliminate the excess of money supply. The decreases of the interest rate will increases investment and increases real output. However, if the interest rates rise, it will cause investment spending and net exports to decline, thus depreciate the value of the local currency and reduce the aggregate output. However, a rise in the money supply reverses the process. It causes a decrease in the interest rates and increase aggregate output. Thus, interest rate is negatively related to the economic growth.

A number of studies argue that interest rates seem to be one of the most significant explanatory factors to the economic growth (Ackley, 1961; Ellahi and Khan, 2011). The negative interactions between these two variables have been extensively confirmed in the empirical findings (Demary, 2010; Ng'etich Joseph Collins, 2011; Akinboade and Kinfack, 2013; Gatawa et al., 2017). In order to determine the relationship between interest rate and economic growth in ASEAN-5, this study assumes that there exists a considerable level of relationship between variables. The interest rates used are money market rate for Indonesia, Philippines and Thailand, interbank overnight money for Malaysia, 3-month interbank rate for Singapore.

3.4.4 Inflation and Economic Growth

Looking at the theories relating to inflation and economic growth, a number of theories and postulations were put forward by Classical, Keynesian, Neo-Keynesian, monetarist, and endogenous growth theorists. Each of the theories has its own

contribution to the inflation-growth relationship. For instance, Keynesian and Neo-Keynesian theory provided a comprehensive model in explaining the inflation-growth relationships under the aggregate supply-aggregate demand (AS-AD) framework. The AS-AD framework postulated that there is a positive relationship between inflation and growth where, as economic growth increases, so did inflation. According to this model, if the AS curve is vertical, changes on the demand side of the economy affect only prices. However, if it is upward sloping, changes in AD affect both price and output (Dornbusch, et al., 1996). In fact, there are various factors which can influence the inflation rate and the level of output in the short-run. These include changes in expectations in labour force, production, monetary and fiscal policy.

Another theory suggests that, inflation has a positive effect on economic growth can be attributed to "Tobin's effect". Tobin (1972) suggests that inflation causes individuals to substitute liquidity for interest earning assets, which leads to greater capital concentration and promotes economic growth. He further argued that, because of the downward rigidity of prices (inflation), the adjustment in relative prices during economic growth could be better achieved by the upward price movement of some individual prices. In fact, inflation shows a positive relationship with economic growth. In response to inflation, the public would prefer to hold less money balances and substitute to other assets, which would lead to the fall in interest rates. In other words, an increase in the exogenous growth rate of money increases the nominal interest rate and velocity of money, but decreases the real interest rates. This view is also supported by Tobin (1965). Mundell (1965) and Tobin (1965) contended that money and capital are substitute. This assumption states that the rise in inflation will increase the cost of holding money and induce a portfolio shift from money to capital which could promote economic growth.

The classical growth theory was first developed by Adam Smith. Adam Smith was the first one who argued that inflation has negative effect on economic growth. The relationship between changes in inflation and the effect of "taxes" on profit and output levels is not specifically stated in classical growth theory. However, the relationship between the two implicit variables is proposed to be negative, as indicated by the reduction in profitability of firms through higher wage costs (Gokal and Hanif, 2004). Friedman (1963) further supports this view especially in a situation where money supply growth is higher than economic growth. In fact, inflation can affect the growth rate of the nation through its effect on capital accumulation, investment and exports (Dornbusch, et al, 2016).

To measure inflation, this study uses the consumer price index (CPI). The consumer price index (CPI) measures the price of a representative basket of goods and services purchased by the average consumer and calculated on the basis of periodic survey of consumer prices. Inflation is measured in terms of the annual growth rate and in index, by referring 2000=100 as the base year. There are some weaknesses of CPI as a measure of price levels. First, it does not reflect the goods and services purchased by firm or government, such as machinery. Second, it does not reflect the change in the quality of goods that may occur overtime. Third, changes in the price of substitute goods are not captured. Despite these limitations, the CPI is still the most widely used as the core indicator of inflation. This is because the CPI represents the cost of living and the CPI data is more appropriate for measuring the welfare of the people. In addition, CPI data is available on a more frequent basis and it is useful for monetary policy purposes.

3.4.4 Exchange Rate and Economic Growth

Exchange rates could affect long-term economic growth and it has an effect on productivity of the economy. The depreciation of the domestic currency is believed to

contribute to the enhancement of external competitiveness which drives production in the export sector. Increased exports and reduced imports are expected to improve the external trade balance due to many developing countries relied that rely on devaluations to increase the balance of payments. According to Agrawal et al. (2010), the appreciation of a domestic currency reduces the competitiveness of exporters in the global market but increases the competitiveness of importers in the domestic market. Conversely, the depreciation of a domestic currency creates the competitiveness of exporters in the global market and downgrades the competitiveness of importers in the domestic market. In fact, large and frequent changes in the exchange rate can create a volatile economic structure, particularly if financial markets are underdeveloped. Such a volatile economy could adversely affect prospects for investment and growth. It could also reduce international trade, especially in economies dependent on intra-regional trade because large exchange rate changes have compounding effects on the costs of intermediate inputs (Thorbecke, 2008).

The exchange rate is defined as the price of one country's currency in relation to another. Exchange rates can be expressed as the average rate for a period of time or as the rate at the end of the period. This indicator is measured in terms of the national currency per US dollar. The exchange rates quoted in the domestic currency for every US dollar (end-month) is used as a measure of exchange rate variables. With regard to ASEAN-5 (Indonesia, Malaysia, Philippines, Singapore and Thailand) the variables are Rupiah / USD, Ringgit / USD, Peso / USD, Singapore dollar / USD and Baht / USD.

3.4.5 Crisis and Economic Growth

There are abounds literature on the financial crises that has been studied by recent studies. Theories on the financial crisis are widely studied and arising from the arguments of classical and Keynesian schools of thought about the nature of a regular and irregular economic cycle. Adam Smith in his theory of invisible hand and economic

crisis opines that the market would always regulate itself and there would be no recession or crisis situation. This theory rejected the possibility of market failure and suggested that the government should not intervene in the market. However, Keynes challenged the classical beliefs at the time by saying that the market would not always keep itself up, and thus, introduced the need for government intervention whenever the market failed.

The Keynesian theory of market clearance and government intervention is the reaction to the classical view following the great depression of the 1930s. He state that the market system operates in a function of cycles over time, thus introducing the concept of business cycles. Business cycle involves periods of economic expansion, recession, trough and recovery. The duration of such stages may vary from case to case. The Asian and global financial crisis in 1997 and 2008 crisis could be considered as another recession that took place after a decade of growing economic activity as evident in most developing countries. Keynes's general theory plays an important role in investment decisions in determining the aggregate level of effective demand, which in turn is the primary factor generating the equilibrium level of output. As literature states, when real economic activity increases during the boom period, corporations has more opportunities to expand their profits, increasing the expected cash flows, and thus, increasing investors' confidence in the stock market (Binswanger, 2000; Hemen et al., 2014).

3.5 Empirical Studies Related to Stock Market, Bank, Real Estate and Economic Growth

The relation between finance and growth has been a focus of attention which has attracted both theoretical and empirical studies to investigate the causal relationship between financial development and economic growth. Schumpeter (1912) argues that the role played by financial intermediaries in mobilizing funds and facilitating transactions should be seen as the important elements in fostering technological innovations and economic growth. In the same vein, Goldsmith (1969) argues that the positive correlation between financial development and growth is mainly due to the efficient use of the capital stock. On the other hand, McKinnon (1973) and Shaw (1973) pointed out that the significance of financial development could stimulate economic growth through high capital productivity. In this paradigm, financial development is seen as a necessary precondition for economic growth. The relation between finance and growth can be classified into four views: supply-leading, demand-following, interdependence and neutrality.

The supply-leading view is the case where finance is considered to be a determinant of economic growth, and the causal relation runs from finance to economic growth. According to this view, stock market contributes to economic growth through two main channels: first, by offering liquidity to investors and also providing firms with access to permanent capita (Rousseau and Wachtel, 2000); second, by relaxing the laws and regulations for both local and foreign investors so as to encourage more listings on the bourse (Zivengwa et al., 2011). This will ensure that there are more players in the stock exchange, increasing competition and quality of securities investments and in turn, resulting in a significant influence on economic growth. The supply-leading view has been debated by McKinnon (1973) and Shaw (1973). They argue that economic growth is hindered when there is repression in the

financial system. This phenomenon leads to low level of saving, credit rationing and low investment. They proposed that financial liberalization allow the real rate of interest to rise, and thus raising the financial savings. In brief, supply-leading view reveals that causal direction between finance to growth is important because it has different implications in explaining the development of policy in the long-run, as well as in the short-run.[5]

Whereas the second channel of causation is the demand-following view which was pioneered by Robinson (1952). He argues that economic growth leads to financial development, which implies that as an economy develops the demand for financial services increases, more financial institutions, financial instruments and services appear in the market. According to this view, financial development depends on the level of economic development rather than the other way around. As the economic growth increases, a larger and more sophisticated financial sector will be required in order to satisfy such a growing demand for financial services (Patrick, 1966). In this regard, the countries need to promote economic growth and later the financial development will automatically follow. This view has been empirically confirmed by the study of Al-Yousif (2002) and Ang and McKibbin (2007). However, this view is regarded as a temporary situation that may persist only under special circumstances, such as transition to a market economy (Blum et al., 2002), thus, it cannot be generalized to the highly regulated economies.

Henceforth, the third view is mutual dependence or interdependence which suggests that the relation between finance and economic growth could lead to feedback causality. In other words, economic growth and financial development can

[5] The empirical studies consistent with this view include those of Bittencourt (2012), Lee (2012), Colombage (2009), Odhiambo (2008), Liu and Hsu (2006), Habibullah and Eng (2006), Chang and Caudill (2005), Beck and Levine (2004), Calderón and Liu (2003), Agbetsiafa (2003), Bhattacharya and Sivasubramanian (2003), Arestis et al. (2001), Xu (2000), Levine et al. (2000), Choe and Moosa (1999), Odedokun (1999), Darrat (1999), Levine and Zervos (1998), Ahmed and Ansari (1998), Rousseau and Wachtel (1998), De Gregorio and Guidotti (1995), King and Levine (1993), and Jung (1986).

complement each other. This view has been championed by Patrick (1966), who was one of the first researchers to the view that at the initial stage, financial development will lead economic growth; however when the real growth takes place in the economy, this link becomes of lesser importance and growth will induce the demand for greater financial services. In this paradigm, economists believe that financial development is crucial for economic growth; while economic growth requires a financial system that is functioning properly and efficiently.[6]

Lastly, the fourth view (neutrality) states that the finance and growth have no causal relation. This view was expressed by Lucas (1988) who contends that "economists badly over-stress the role of financial factors in economic growth". According to this view, there is no relationship between finance and economic growth. In other words, although the economy grew as the financial sector grows; both of the indicators have no causal relationship. Empirical studies who has supported this view including Ibrahim (2007), Chang (2002), and Shan et al. (2001), and others.

In brief, the following section proceed to a discussion of the stock market bank and real estate functions, and the ways in which these functions can affect economic growth. The section discusses the relationship between: (i) stock market and economic growth, (ii) banks and economic growth, and (iii) real estate and economic growth. Reviewing the functions of financial and non-financial sector is important to understand how these sectors (stock market, banking and real estate) related to economic growth. Thus, the study review the past studies in the context of

[6] The empirical studies include those of Bangake and Eggoh (2011), Hassan et al. (2011), Wolde Rufael (2009), Abu-Bader and Abu-Qarn (2008), Odhiambo (2005), Hondroyiannis et al. (2005), Calderón and Liu (2003), Shan et al. (2001), Demetriades and Hussein (1996).

developed and developing countries for better understanding and further insight on the link between finance and growth.

3.5.1 Stock Market and Economic Growth

The relationship between stock market and economic growth has been the focus of an immense body of theoretical and empirical research since the seminal work Goldsmith (1969). Goldsmith (1969) was the first one who assessed the positive relationship between stock market and economic growth. The author uses the GDP percentage of financial intermediary assets and established a positive correlation with growth for 35 countries. Whereas Bosworth (1975) observed similar cyclical patterns in the stock market and real economic activity with changes in nominal stock returns preceding production changes. Subsequent work by Barro (1990) Fama (1981, 1990), and Schwert (1990) also confirmed that real stock returns are highly correlated with future real activity. The evidence from these studies reveal that stock markets is a good proxy as a leading indicator for future economic activity, and also show that stock returns is never led by any of the real variables (Fama, 1981). In fact, stock markets have become the central focus of development economists and policymakers because of the perceived benefits they provide to the economy either directly or indirectly. These benefits include savings mobilization, risk diversification and management, facilitating the exchange of goods and services, and ensuring corporate governance and control.

At the same time there is also an increase in theoretical literature, suggesting that a well-functioning stock market can play an important role in the economic development process with the performance of financial functions. This functions including risk diversification, liquidity facilitation, promotion of corporate control and monitoring, collection and dissemination of information about companies, and transmitting routes for monetary policies. Through these functions, a well-

functioning stock market can promotes growth by changing the rate of savings, technological progress, and economic efficiency.

However, there are disagreements about the effect of the stock market on economic growth, with some theoretical works indicating that economic growth has actually been slowed by stock market developments. In other words, there is a difference in opinion among economists about the relationship between stock market development and economic growth and the position of stock market in emerging economies. There is a view that stock markets in such economies do more harm than good as they distort capital formulation and resource allocation. This is a result of the lack of careful regulatory authorities, high transaction costs, inadequate competition, and lack of investors due to the deficient of information flows.

Several empirical estimations suggest that well-functioning banks encourage and accelerate economic growth, but these studies rarely examine stock market development at the same time. Beck and Levine (2004) emphasize that banks and the stock market each have a separate effect on economic growth . They found that bank credit and turnover ratio enter each of the five regressions understudy significantly at 5 percent significance level. However, bank credit does not enter significantly when controlling for either trade openness or inflation. Using three alternative panel specifications, the GMM estimator reject the hypothesis that financial development is unrelated to growth. Stock market development and bank development jointly enter all of the system panel growth regressions significantly using alternative conditioning information sets and alternative panel estimators. Thus, after controlling for country specific effects, their study is consistent with theories that emphasize an important positive role for financial development in the process of economic growth.

On the other hand, the link between stock market liquidity and economic growth arises as some high return projects require long-term capital commitments, but savers do not like to relinquish control their savings for long periods. If the financial system does not increase the liquidity of long-term investments, less investment is likely occurring in high return projects. Therefore, according to Levine (1997), liquidity in stock markets, bond markets and financial intermediaries not only provides a mechanism for diversifying risks, but also enhances long-term economic growth prospects as it facilitates long-term investments and increases profits.

Furthermore, Rousseau and Wachtel (2000) reviewed two aspects of stock market development by looking at: (i) market size as demonstrated by total market capitalization, and (ii) size and liquidity in the market as demonstrated by the volume of trading activity. Their results indicate that stock market liquidity is important for growth in per capita income than the size of the market. In addition, they explain four reasons why the stock market is an important financial institution even though equity issuance is a relatively small source of funds. First, the equity market provides venture capital investment and increase entrepreneurial activity. Secondly, the capital inflows of foreign direct investment capital and portfolio investments potential to be an important source of investment funds for emerging markets and transition economies. The existence of equity market facilitates capital inflows and the ability to finance current account deficits. Third, the provision of liquidity through organized exchange encourages both international and domestic investors to transfer their surpluses from short-term assets to long-term capital markets, where funds can provide access to fixed capital for firms to finance larger projects. Finally, the existence of the stock market provides important information that improves the efficiency of financial intermediation. For traded companies, the stock market increases the flow of information from management to owners, provides benchmarks

for the value of business assets, helping entrepreneurs and investors, and also increasing the depth and efficiency of the company's assets.

3.5.2 Banks and Economic Growth

Empirical studies on finance and economic growth suggest that financial functions provided by banks and other financial intermediaries are important in promoting economic growth. The theoretical and empirical studies strongly support the view that by improving information services of commercial banks, it can provide stable economic growth to the country. The recent literature also highlights the countries that adopt sound macroeconomic policies and establish a well-developed banking sector will experience sustainable higher economic growth. In broad-spectrum, empirical evidence from the developed and developing countries reveals that banking sector and other financial intermediaries are main force that can bring about high economic growth and predict the future economic growth. In general, all these empirical studies suggest that a well-developed financial system is growth-enhancing, and hence, consistent with the proposition that finance plays an important role in the process of economic growth or else "more finance led to more growth".[7]

Not surprisingly, the relationship between banking sector development and economic growth has received much attention and become an important area of discussion among researchers and policymakers (for instance, Levine and Zervos, 1998; Levine,1998; Levine et al., 2000; Caporale et al., 2004; Beck and Levine, 2004; Dritsaki and Dritsaki-Bargiota, 2005; Tang, 2005; Naceur and Ghazouani, 2007; Deidda and Fattouh, 2008; Cole et al., 2008; Wu et al., 2010; Banos et al., 2011; Moshirian and Wu, 2012; Kim and Lin, 2013; Pradhan et al., 2014a; Pradhan et al., 2014b; Law and Singh, 2014). However, what remains unclear is the direction

[7] See, for example, Law and Singh (2014), Pradhan et al. (2014a), Wu et al. (2010), Cole et al. (2008) and Tang (2005).

of the causal effect between banking sector development and economic growth so far lead to the inconclusive findings. It is thus still open to question whether banking sector development enhances economic growth or whether it is economic growth that drives the development of the banking sector.

Ghosh (2017b) uses a sample of 138 nations covering the advance and emerging economies to investigate the effect of banking sector globalization on economic growth covering the period 1995–2013. Following standard conventions in empirical growth regressions, he constructs a panel with data averaged over five-year intervals to abstract from business cycle relationships. The results reveal that the higher share of foreign bank assets reduces growth when using the fixed effects model. Both the shares of foreign banks and foreign bank assets significantly reduce economic growth in the emerging and developing market economies. Higher loans from non-resident banks and higher share of foreign bank assets significantly reduce economic growth when using the fixed effects model in low income countries. Thus, a greater share of foreign banks and foreign bank assets will lower growth. Meanwhile, the results for advanced economies show that all three variables to measures banking sector globalization (for instance foreign bank entry, the ratio of foreign bank assets to total assets, and ratio of outstanding loans from banks outside the country) are all statistically insignificant to economic growth. His findings show that by reducing the banks' cost of obtaining information about potential clients, it may improve the network of foreign bank while reducing the scope of the systemic downturn from domestic banks in response to increased competition. This will assist in a greater allocation of credit which will contribute positively to economic growth.

Kjosevski (2013) construct fixed-effects model to examine empirically whether relatively larger, more efficient banking sectors play a growth-supporting role in economic growth in transition economies. He found that, an efficient banking sector

decreases the transaction costs and the margin between lending and deposit rates, channeling saving into investments and promotes economic growth. In addition, the development of the banking sector may induce higher economic growth by allocating financial resources efficiently and combined with sound regulation of the banking system. A sound banking system instills confidence among the savers so that resources can be effectively mobilized to increase productivity in the economy (Tang, 2005; Kim and Lin, 2013; Pradhan et al., 2014a).

Under this circumstance, there is a view suggests that causality runs from economic growth to banking sector development. This refers to the economic growth is an important determinant of the banking sector development. The empirical work by Tang (2005) in ASEAN-5 study shows that the demand-following view (economic growth led to the development of the financial sector) is supported only for Singapore data, which implies that thrived in economic growth plays an important role in the development of the financial sector. However as articulated by Banos et al. (2011), as for the less developed regions; commercial, thrift or rural banks do not seem to provide any significant contribution to economic development. The idea is that as the economy grows, an additional banking institutions and banking products and services have less response to economic growth. Thus, the dearth of banking institutions in developing countries indicates a lack of demand for financial services.

Dritsaki and Dritsaki-Bargiota (2005) examined the relationship between banking sector and economic growth in Greece by using the VAR model with an error correction mechanism and also Granger causality test. Briefly, the tests for Granger-causality demonstrate that there is a bilateral causal relationship between banking sector development and economic growth. This suggests that economic growth and banking sector development complement and reinforce each other, making banking

sector development and real economic growth mutually causal. The argument in favor of the bidirectional causality stressed that development in the banking sector is indispensable for economic growth and economic growth requires a well-developed banking system. Bidirectional causality between financial development and economic growth in their findings are highly consistent with the theoretical predictions of both the finance-growth literature and the endogenous growth models (Greenwood and Jovanovic, 1990).

Nevertheless, there is a contradictory view of the effect of the bank on economic growth, with some empirical work found no statistically significant relationship between banking sector development and economic growth (Tang, 2005; Moshirian and Wu, 2012; Law and Singh, 2014). In the study of Tang (2005), his empirical work fail to find any evidence of banking sector development causes economic growth or vice versa in three ASEAN countries (Indonesia, Malaysia and Philippines). Whereas the others two ASEAN countries (Singapore and Thailand), shows that banking sector causes economic growth in Thailand and economic growth causes bank sector in Singapore. Hence, the results indicate that the relationship between financial development and economic growth in ASEAN countries do not provide any definite conclusion on the nature and direction of this relationship and there is no consensus among economists about the nature of this relationship. Furthermore, a few other studies also find some evidence similar to that of Tang (2005). Moshirian and Wu (2012) examine bank volatility and future economic growth in 18 developed and developing countries including Indonesia, Malaysia, Philippines and Thailand. Their study find significantly negative link between bank volatility and future economic growth. The association between bank volatility and future economic growth is significantly negative for the sample including all markets, and this negative relationship is primarily induced by data from the

emerging markets. Indeed, more evidence on the relationship between banking sector development and economic growth is presented in the work of Law and Singh (2014). They find that the level of financial development is beneficial to growth only up to a certain threshold; beyond the threshold level further development of finance tends to adversely affect growth. Their findings reveal that when the private sector credit grows, it does not promote growth but in fact harms it. They conclude that more finance is not necessarily good for economic growth. Thus, measures to strengthen quality and moderate finance should be undertaken in promoting more finance and fostering economic development. In addition, if the role of finance is minimal or negative in a particular situation, growth-enhancing strategies need to be highlighted in maintaining long-run economic benefits, although financial development has been identified as one of the most powerful determinants of growth.

Ghosh (2017a) also highlight that the bank–growth relationship turns negative if there were credit supply constraints. This high bank failure triggered a decrease in aggregate demand, led firms to cut production and investment projects, thereby reducing the level of production. Bank failure is still important in affecting regional economic activity. This suggests that the benefits from deposit insurance may not necessarily come from banking crisis, but from the ability of the banking sector to maintain liquidity or credit supply in times of distress. When credit flows are disrupted, potential borrowers at a regional level such as construction companies and building contractors are unable to secure funds to carry out beneficial activities or investments, this in turn result to a decline in employment and production income.

3.5.3 Real Estate and Economic Growth

The relationship between real estate prices and economic growth has been studied extensively in the literature. Basically, there are four strands of research in the existing literature. However, this study identify three causal exists between real

estate price and economic growth related to this issue. Therefore, this section intends to review briefly some of these studies.

The first strand of research argued that real estate prices is a positive and significant determinant to economic growth (e.g. Guo and Huang, 2010; Gholipour, 2013). Guo and Huang (2010) analyzed the effect from speculative capital inflow on the fluctuations of real estate market and stock market through monthly time-series data in China covering the period from January 1997 to October 2008. The speculative funds aggravate the inflated short-term real estate price and obviously enhance the volatility of real estate market. Furthermore, share price shocks generate higher housing prices, whereas real interest rate shocks result in tumbling housing prices. He contends that the findings in this study can be very informative and contain practical implications for the central bank of China as well as other countries in terms of implementing currency policies on international capital flows, as any major change in this case would be detrimental to international trade and smoothness from financial markets. Gholipour (2013) uses a sample of 21 emerging economies over the period 2000–2008 to examine the effect of foreign investment in real estate sector on house prices. The results reveal that foreign investment in real estate sector is a significant determinant of house price appreciations. He stressed that the government should attempt to attract more foreign investors into property sector as foreign investment in the real estate sector has some benefits to the country's economy such as injection of financial resources, generate employment, facilitate urban development, introduce additional competition in real estate sector and introduce new practices in the operation of real estate industry. Specifically, he suggested that policymakers should prevent speculative capital flow into the real estate sector that can create property bubbles. Based on the above studies, it indicates

that real estate market promotes economic restructuring and its development was fueled by the economic growth (Chen et al., 2009).

The second strand claims that an increase in economic activities increases the real estate prices (Adams and Fuss, 2010; Demary, 2010). Adams and Fuss (2010) examine the long-term effect and short-term dynamics of macroeconomic variables on international housing prices. Using a sample of 15 countries over a period of 30 years, the results indicate that an increase in economic activities through real industrial production increases the demand for houses. Since the real estate stock cannot change in the short run, thus increases in the rents leading to higher house prices. He argues that if house prices adjust below construction costs, it eventually decreases as well adding to the effect of low demand in the property market. Modeling this relationship clearly can provide additional insights into the underlying structure of house price adjustments in international housing markets. Demary (2010) in the same strand noted that the house prices are driven by output movements in OECD countries. He examines the linkages between real house prices and the price level, output and interest rates through annual time-series data for 10 OECD countries covering the period 1970 to 2005. The study revealed that inflation shocks and interest rates shocks were surprisingly lower in house prices, while output shocks increased them. In addition, house prices move with conditional outputs on all three shocks and their response is greater as compared to the output response. The reason is that housing supply is not stable (inelastic) in the short run. This suggests that changes in monetary policies will effect economic growth in response to a drop in housing market demand due to inflationary effects.

Finally, the third strand shows there is no causal relation between real estate and economic growth. The examples of studies in this context are Jing and Yat (2012) and Gholipour et al. (2014). Jing and Yat (2012) empirically examine the factors

underpinning China's real estate price escalation from 1998 to 2009. Using cointegration approach, vector error correction model and Granger causality test, they analyze whether stable and long-run equilibrium interactions exist between housing prices and key macroeconomic variables, such as inflation, land sale and economic growth. The study found that economic growth does not cause Granger house prices, indicating personal gain (disposable income) does not catch up with economic growth in China. Neither is there a feedback effect from house prices to economic growth, indicating housing price appreciation does not result in immediate capital gain or speculations in housing purchase. Besides, lack of cointegration relationships between house prices and land sale is probably caused by restrictive policies on land supply. They stressed that the Asian financial crisis in 1997 gave Chinese leaders a shock on the economic front, yet the actual crisis was remote to the country because of government's regulation on foreign exchange market. In the aftermath of the crisis, the Chinese economy went into deflation from 1998 to 2002. He suggested that, by easing monetary policy such as reducing loan rates and exempting related taxes were aiming at increasing housing supply, for China's economic growth is largely driven by housing investment (Hongyu et al., 2002; Chen and Zhu, 2008). In the same vein, Gholipour et al. (2014) using panel causality tests with vector error correction model on time series data of 21 OCDC countries from 1995 to 2008 find that foreign direct investment in real estate does not have significant effect on property prices and economic growth in the short-run and long-run. Their study reveals that the property prices in OCDC countries are mostly affected by economic activities and inflation.

Table 3.1: Studies on Stock Market, Banks, Real Estate and Economic Growth

Author (Year)	Countries of Study/ Sample Period	Estimation Method	Variables	Findings
Stock Market and Economic Growth				
Rousseau and Wachtel (2000)	47 developed and developing countries (including Indonesia, Malaysia, Philippines, Singapore and Thailand) 1980–1995	Two-stage least squares regressions, generalized method of moments (GMM) techniques and impulse response functions (IRF)	Real per capita gross domestic product, liquid liabilities (M3/GDP), stock market capitalization and total value traded.	The findings show that stock markets promote economic growth.
Hassapis and Kalyvitis (2002)	G-7 countries 1957Q2–1998Q1	Granger causality tests and impulse response function	Stock price indices and industrial production indices.	The finding shows that real stock price and output growth is strongly related. Moreover, unanticipated movements in output and real stock prices are found to play a role in future economic growth.
Caporale, Howells and Soliman (2004)	Argentina, Chile, Greece, Korea, Malaysia, Philippines and Portugal 1977:1–1998:4	Unit root test, bivariate causality test and trivariate causality test.	Nominal GDP, stock market development (market capitalisation ratio and value traded ratio) and bank development (bank deposit liabilities/ GDP and bank claims on the private sector/GDP).	The evidence obtained from a sample of seven countries suggests that a well-developed stock market can foster economic growth in the long run. The study suggests that well-functioning stock markets can promote economic development.
Beck and Levine (2004)	40 countries (including Indonesia, Malaysia, Philippines and Thailand) 1976–1998	Generalized method of moments (GMM) techniques	Real per capita GDP, stock market development (turnover ratio, value traded and market capitalization), bank development (bank credit), policy (the black market premium, the share of exports and imports/ GDP, inflation rate and ratio of gov. expenditures/GDP)	The findings emphasize that financial development is important to the process of economic growth.

Table 3.1 continued

Dritsaki and Dritsaki-Bargiota (2005)	Greece 1988:1–2002:12	Unit root test, Johansen cointegration test, VECM, Granger causality test	Economic development (industrial production indices), stock market development (market capitalization) and M2 (banking sector).	The results of causality analysis show that there is a unidirectional causality relationship between economic growth and stock market development.
Nieuwerburgh, Buelens and Cuyvers (2006)	Belgium 1830–2000	Unit root test, Granger causality tests, bivariate error correction model (VECM)	Market capitalization and number of listed shares, financial intermediation (deposits in commercial banks and savings in commercial banks), bank development (bank note circulation) and real per capita GDP.	The findings show that economic growth has an enormous role to the stock market.
Naceur and Ghazouani (2007)	11 MENA region countries 1979–2003	Dynamic panel model with generalised method of moments (GMM) estimators	Real per capita GDP, stock price indices, stock market development (stock market capitalization, stock markets liquidity, turnover ratio), bank development (private credit, liquid liabilities, composite indices of bank development), trade openness, foreign direct investment, black market premium, inflation, gov. consumption, dummy variable for oil prices, dummy variable for financial crisis, dummy variable for legal system.	The empirical results reveal that there is no significant relationship between stock market development and growth.
Mun, Siong and Thing (2008)	Malaysia 1977–2006	Unit root tests and Granger causality test	Real GDP and stock price indices.	The study found that stock market Granger-caused economic activity, no reverse causality was observed.

Table 3.1 continued

Shahbaz, Ahmed and Ali (2008)	Pakistan 1971–2006	Unit root test, Johansen cointegration test, ARDL bounds test and Granger causality test	Real GNP per capita and market capitalization.	There is a long-run relationship between stock market development and economic growth. The result indicates that stock market development is important for economic growth.
Liu and Sinclair (2008)	China, Hong Kong and Taiwan 1973:1–2003:2 (Hong Kong), 1967:1–2003:2 (Taiwan), 1992:2–2003:2 (China)	Unit root test, Johansen cointegration test and Granger causality test	Real GDP and stock price indices.	The findings reveal that stock prices lead economic growth in the short-run and economic growth is the main determinant of the stock markets in the long-run.
Deidda and Fattouh (2008)	100 countries 1980–1995	OLS regression	Real per capita GDP, banking development (claims on private sector by deposit money banks/GDP), stock market turnover, cross-country growth rates, average school years in the population over 25, gov. expenditure as share of GDP, inflation, trade openness and black market premium.	The empirical findings found that stock market development has a positive effect on growth.
Tsouma (2009)	35 developed and developing countries (including Indonesia, Malaysia, Singapore Philippines and Thailand) 1991:1–2006:12	Bivariate VAR model and Granger causality tests	Stock price indices, industrial production indices, consumption price indices.	The study found unidirectional relationship running from stock returns to future economic activity.
Enisan and Olufisayo (2009)	Sub-Saharan Africa 1980–2004	Autoregressive distributed lag (ARDL) bounds test, Granger causality test	Market capitalization ratio and the value traded ratio.	Granger causality with VECM shows unidirectional causality from stock market to economic growth. While, Granger causality with VAR shows bidirectional causality from stock market to economic growth.

Table 3.1 continued

Wu, Hou and Cheng (2010)	13 countries in European Union (EU) 1976–2005	Panel unit root test, autoregressive distributed lag (ARDL), impulse response analysis	Real GDP, banking development (M2/GDP, ratio of deposit money banks' domestic assets to the sum of domestic assets in deposit money banks and the central bank) and stock market development (ratio of market value of domestic shares listed on domestic exchanges/GDP, the value of the trades of domestic shares on domestic exchanges/ the value of listed domestic shares).	Stock market liquidity has a short-term negative effect on economic growth.
Cooray (2010)	35 developing countries (including Indonesia, Malaysia, Philippines and Thailand) 1992–2003	OLS estimates and general method of moments (GMM)	Real per capita gross domestic product, annual average growth rate of labour force, average population growth rate, net secondary enrolment ratio, net primary enrolment ratio, market capitalization, market liquidity and the turnover ratio.	Stock market is an important variable in determining the long run growth of the group of countries examined.
Zivengwa, Mashika, Bokosi and Makova (2011)	Zimbabwe 1980–2008	Unit root tests, Granger causality tests, VAR, IRF and VDC.	Real per capita GDP, stock market capitalization, stock market turnover and investment.	The results suggest that stock market capitalization and stock market turnover have a positive influence on real GDP per capita.
Kolapo and Adaramola (2012)	Nigeria 1990–2010	Unit root test, Johansen cointegration and Granger causality tests	GDP, market capitalization, total new issues, value of transactions, total listed equities and government stock.	The evidence from this study reveals that the activities in the capital market tend to effect positively on the economy.

Table 3.1 continued

Teng, Yen and Chua (2013)	Indonesia, Malaysia, Philippines, Singapore, Thailand, China, India, Japan and U.S 1991:1–2010:6	Parametric and non-parametric approaches	Stock market composite index and industrial production indices.	The ASEAN-5 stock markets have the high correlations with economic activities in developed economies (Japan and U.S) as compare to the emerging economies (China and India).
Pradhan, Arvin, Bele and Taneja (2013)	16 Asian countries (including Indonesia, Malaysia, Philippines, Singapore and Thailand) 1988–2012	Panel unit root test, Pedroni's panel cointegration test and panel Granger causality tests.	Stock market indicators (stock market size, stock market liquidity and stock market turnover), inflation and economic growth indicators (GDP, real per capita GDP).	The finding reveals presence of unidirectional causality from stock market development to economic growth. The results suggest that stock market development have a positive long run effect on economic growth.
Kim and Lin (2013)	96 countries 1976–1998	simultaneous equations model (SEM)	Per capital GDP growth rate, bank development (bank credit), stock market development (turnover ratio), control variables (initial real per-capita GDP, average years of schooling, ratio of government expenditure to GDP, share of exports and imports to GDP, consumer price indices, black market premium)	Stock market development is more favorable to growth in high-income.
Pradhan, Arvin, Hall and Bahmani (2014a)	26 countries (including Indonesia, Malaysia, Philippines, Singapore and Thailand) 1961–2012	Unit root test, cointegration test, panel vector auto-regressive (VAR) model for testing the Granger causalities, impulse response functions, principal component analysis (PCA)	Banking sector development, stock price indices, real per capita gross domestic product, foreign direct investment, trade openness, inflation rate and government consumption expenditure.	Stock market development matter in the determination of long-run economic growth. However, no causal is detected between stock market to growth in of ASEAN-5 countries.

Table 3.1 continued

Banking Sector and Economic Growth				
Levine, Loayza and Beck (2000)	74 countries (including Indonesia, Malaysia, Philippines and Thailand) 1960-1995	Ggeneralized method of moments (GMM) and cross-sectional instrumental-variable estimator	Real per capita GDP, government size, trade openness, avg. years of secondary schooling, liquid liabilities, commercial central bank, private credit, inflation rate and black market premium.	The panel and cross-sectional results reveals that financial intermediary development is positively associated with economic growth.
Caporale, Howells and Soliman (2004)	Argentina, Chile, Greece, Korea, Malaysia, Philippines and Portugal 1977:1-1998:4	Unit root test, bivariate causality test and trivariate causality test.	Nominal GDP, stock market development (market capitalisation ratio and value traded ratio) and bank development (bank deposit liabilities/GDP and bank claims on the private sector/GDP).	The study finds evidence of causal link between bank development and economic growth.
Dritsaki and Dritsaki-Bargiota (2005)	Greece 1988:1–2002:12	Unit root test, Johansen cointegration test, VECM, Granger causality test	Economic development (industrial production indices), stock market development (market capitalization) and M2 (banking sector).	The results of Granger causality analysis showed that there is a bilateral causal relationship between the banking sector development and economic growth.
Tang (2005)	Indonesia, Malaysia, Philippines, Singapore and Thailand 1965-2001	Unit root test (PP, KPSS), cointegration test and Granger causality test.	Volume of credit stock from money deposit banks and real GDP.	The result shows that bank lending caused economic growth in Thailand. In the meantime, economic growth causes bank lending is only evidenced in Singapore. This implies that real sector activity is an important determinant of intermediary development in Singapore. There is no evidence of bank lending causes economic growth or vice versa in Indonesia, Malaysia and the Philippines.

Table 3.1 continued

Naceur and Ghazouani (2007)	11 MENA region countries 1979–2003	dynamic panel model with generalised method of moments (GMM) estimators	Real per capita GDP, stock price indices, stock market development (stock market capitalization, stock markets liquidity, turnover ratio), bank development (private credit, liquid liabilities, composite indices of bank development), trade openness, foreign direct investment, black market premium, inflation, gov. consumption and dummy variables (oil prices, financial crisis, legal system).	The empirical results reveal that there is no significant relationship between banking sector development and economic growth.
Deidda and Fattouh (2008)	100 countries 1980–1995	OLS regression	Real per capita GDP, banking development (claims on private sector by deposit money banks/GDP), stock market turnover ratio, cross-country growth rates, average school years in the population over 25, gov. expenditure as share of GDP, inflation, trade openness and black market premium.	The empirical findings suggest that bank sector development have a positive effect on economic growth.
Cole, Moshirian and Wu (2008)	36 developed and developing countries (including Indonesia, Malaysia, Philippines and Thailand) 1973-2001	Generalized method of moments (GMM) techniques	GDP, market excess return, stock returns of banking industry, gov. ownership of banks, insider trading law, banking crises, bank-accounting-disclosure standards, private credit, liquid liabilities and commercial-central bank.	Stock returns of the banking industry can predict future economic growth. The study also find that much of predictive power of bank stock returns is captured by a series of country-specific and banking institutional characteristics.

Table 3.1 continued

Wu, Hou and Cheng (2010)	13 countries in European Union (EU) 1976–2005	Unit root test, autoregressive distributed lag (ARDL), impulse response analysis	Real GDP, banking development (M2/GDP, ratio of deposit money banks' domestic assets to the sum of domestic assets in deposit money banks and the central bank) and stock market development (market value of domestic shares, trades of domestic shares).	The results show a long-run equilibrium relationship between banking development and economic development exist.
Banos, Crouzille, Nys and Sauviat (2011)	Philippines 1993-2005	Principal component analysis (PCA)	GDP per economic sector (agriculture, industry and services), the share of total net loans over nominal regional GDP, the share of total deposits over regional GDP, the number of banking offices per capita, the volume of total net loans and banking development (total net loans over total deposits).	The results show positive link between economic development and banking development with a specific influence of rural banking mainly in the intermediate developed regions.
Moshirian and Wu (2012)	18 developed and developing countries (including Indonesia, Malaysia, Philippines and Thailand) 1973-2006	Generalized method of moments (GMM) techniques	GDP, market price indices, interest rate, market capitalization, dummy variables (government ownership of banks, insider trading law, banking crises, bank accounting disclosure standards), domestic credit to the private sector/GDP, liquid liabilities/GDP and domestic assets of commercial banks.	The study finds significant negative relationship between bank volatility and future economic growth. This is due to the fact that excessive banking industry volatility may indicate lower future economic growth.

Table 3.1 continued

Kim and Lin (2013)	96 countries 1976–1998	simultaneous equations model (SEM)	Per capital GDP, bank development (bank credit), stock market development (turnover ratio), control variables (real per capita GDP, average years of schooling, ratio of gov. expenditure to GDP, exports + imports/GDP, CPI, black market premium).	The study shows that banking sector development matters more for growth in low-income countries.
Pradhan, Arvin, Hall and Bahmani (2014a)	26 countries (including Indonesia, Malaysia, Philippines, Singapore and Thailand) 1961–2012	Unit root test, cointegration test, panel vector auto-regressive, Granger causalities, IRF principal component analysis (PCA).	Banking sector development, stock price indices, real per capita GDP, foreign direct investment, trade openness, inflation rate and gov. consumption expenditure.	The banking sector development is important in the determination of long-run economic growth. However, there is no causality exists between banks to growth particularly in the case of ASEAN-5 countries.
Pradhan, Arvin, Norman and Nishigaki (2014b)	34 OECD countries 1960–2011	Unit root test, Pedroni panel cointegration test, Granger causality test, generalized impulse functions	Banking-sector development (money supply/GDP, claims on assets/ GDP, domestic credit by banking sector/GDP, domestic credit by private sector/GDP, liquid liabilities/ GDP), real per capita GDP and inflation.	The finding reveals unidirectional causality exists from banking sector development to economic growth.
Law and Singh (2014)	87 developed and developing countries (including Indonesia, Malaysia, Philippines, Singapore and Thailand) 1980–2010	Dynamic panel threshold estimations	Banking sector development (private sector credit/GDP, liquid liabilities/ GDP, domestic credit /GDP), growth rate, real per capita GDP, population, investment, average years of secondary schooling, trade openness, gov. expenditure, inflation and institutions.	The finding reveals that finance is not necessarily good for economic growth and highlight that an ‘‘optimal’’ level of financial development is more crucial in facilitating growth.

Table 3.1 continued

Real Estate and Economic Growth				
Adams and Fuss (2010)	15 OECD countries 1975Q1–2007Q2	Unit root test, panel cointegration test, error correction model (ECM).	Money supply, consumption, industrial production indices, real GDP and employment.	The empirical results suggest that macroeconomic variables significantly effect house prices. In particular, an increase in economic activity raises the demand for house as well as housing prices in the long-run.
Guo and Huang (2010)	China 1997:1–2008:10	Unit root test, Markov regime-switching model, Granger causality test, generalized impulse response functions, variance decomposition analysis.	Hot money (change in foreign exchange reserves- trade and service balance-foreign direct investment), housing price, stock price, per capita GDP, interest rate, P/E ratio and housing supply.	The study finds that the share price shocks generate higher housing prices, while the real interest rate shocks resulting fall in housing prices.
Demary (2010)	10 OECD countries 1970Q1–2005Q4	Vector autoregression (VAR), IRF and VDC.	Real house price indices, GDP, interest rates and price level (GDP deflator).	The house prices are driven by output movements in most countries, while house prices are more volatile compared with output.
Jing and Yat (2012)	China 1998–2009	Unit root tests, Johansen cointegration test, VECM, Granger causality test.	Real estate price, inflation, real estate developers' land acquisition cost and GDP.	Granger causality test reveals that economic growth does not Granger cause real estate price.
Gholipour (2013)	21 emerging economies (including Malaysia, Philippines and Thailand) 2000–2008	Impulse responses function, variance decompositions	GDP, interest rate, foreign real estate investment, construction cost and housing price indices.	The empirical results show that foreign real estate investment contributes to house price increases.
Gholipour, Al-Mulali and Mohammed (2014)	21 OECD countries 1995–2008	Panel unit root tests, Engle and Granger two-step cointegration tests, Johansen conintegration test and panel causality tests with VECM.	FDI inflows to the real estate sector, GDP, interest rate, inflation and house price.	The empirical results show that FDI in real estate does not cause property price appreciations and also does not contribute to economic growth in OECD countries in the short run and the long run.

3.6 Summary

Empirical evidence on finance-growth link provides mixed results. The empirical studies mainly focus on developed countries. The results from this collection of studies strongly believe that financial development promotes economic growth.[8] The study supports the belief that there is a strong link between the financial development and economic growth in the short-run as well as in the long-run. In contrast, the finance-growth literatures in this area of study do not find convincing evidence that financial development positively and significantly influences economic growth. According to their results, financial development has no effect on economic growth and shows inconclusive findings due to the proxies used to measure financial development.[9] This is due to the excessive in financial deepening or too rapid growth of credit may lead to inflation and weakened banking systems which in turn prevent growth. Moreover, Ang, 2007 and Odhiambo, 2008 argue that the financial development does not cause the economic growth but the economic growth causes the financial development. They suggest that financial liberalization must be carefully planned, timed and closely monitored. This means that financial system must be properly shaped before undertaking any liberalization program.

Much of the early studies concentrated on stock market, bank credit and broad money over growth to represent the financial development. The existence of the findings justified based on the financial development influences and promotes the economic growth. But, a considerable amount of work on stock market and

[8] Those studies include King and Levine, 1993b; Jayaratne and Strahan, 1996; Levine and Zervos, 1998; Levine et al., 2000; Xu, 2000; Christopoulos and Tsionas, 2004; Habibullah and Eng, 2006; Amiruddin et al., 2007; Islam and Osman, 2011; Bittencourt, 2012; Campos et al., 2012 and Zhang et al., 2012.

[9] See Caselli et al., 1996; Al-Yousif, 2002; Mitra et al., 2007; Handa and Shubha, 2008; Hasan et al., 2009; Hakeem, 2010; Ellahi and Khan, 2011; Goaied and Sassi, 2011; İnce, 2011; Kar et al., 2011; Rousseau and Wachtel, 2011; Al-Malkawi et al., 2012 and Menyah et al., 2014.

economic growth deals with economic growth causes financial development. The commonly used methods are simple regression analysis, cointegration test and granger causality. However, estimated the economic growth with sectoral stock indices via stock market, banks and real estate relatively receives less attention. This is because the channel is less controversial and not well-determined. Some works on the issue are discussed by Evrensel and Kutan (2007). They argue that stock market responded to IMF-related news such as announcements of program negotiations and approval is varying among countries. In fact, the weaknesses in the stock market have been viewed as a major source of the crisis. Thus, the reduction of bank interest rate on a reasonable level could increase liquidity in the market, and may perhaps stimulate economic growth (Alnajjar et al., 2010).

Mansor (2007) and Ellahi and Khan (2011) present empirical evidence on financial development and economic growth in developing countries. Likewise, the results are varied. It is important to note that most of the studies complied exclusively based on the aggregate data. Alnajjar et al. (2010) and Evrensel and Kutan (2007) uses disaggregate financial data to explore the effect of crisis on the financial sector. Among the sectoral data use are banks, insurance, diversified financial services, real estate and investment. Disaggregate data analysis reveals that some sectors are more sensitive to economic growth. In short, this gap and mixed results deserve further research.

Furthermore, there are no studies in developing countries which focus totally on the financial and non-financial sectoral stock indices particularly in the banks and real estate sector. Also, the issue concerning finance and growth remains controversial and still debated. Therefore, disaggregate the data from stock market index into bank and real estate index can give better explanations regarding the stock market-economic growth relationship. The inclusion of financial and non-financial

sectoral estimates can provide more meaningful evidence on financial sector capability to stimulate economic growth. This approach not only provides more comparative evidence in the findings, but also the magnitude of estimates in understanding how the financial sectoral react to the changing in the economic uncertainty.

CHAPTER 4: THEORY AND RESEARCH METHODOLODY

4.1 Introduction

This chapter begins with the theoretical framework of stock market and economic growth. The section discusses the theoretical framework related to the stock market and economic growth. It discusses the relevant theories used in this study. The theories are the quantity theory of money, the loanable funds theory, liquidity preferences, Mundell-Tobin effect and Van Wijnbergen IS-LM model. It is vital to understand the link between stock market and economic growth through insights pertaining to theory.

The second section discusses the finance-growth transmission channels relating to stock market and economic growth. The transmission channel is divided into three channels: stock price, bank lending and real estate price channels. Then, the third section discusses the estimating model, model specification and sources of data that used in this study. Afterwards, it provides a concise description of variable selection and a detailed explanation of the econometric methodology that is utilized to obtain the aim and objectives of the research proposed in Chapter 1.

Various techniques including unit root tests, Johansen cointegration test, Granger causality test, vector error correction model (VECM) and dynamic analysis (impulse response function and variance decomposition) were used in this study. The Granger causality test is used to clarify the direction of each existing interactions and to validate the cointegration results. Whereas, the vector error correction model (VECM) is used to analyze the causal relationship of the channel and economic activity. The relationship amongst variables is estimated through the various lag regressor. Specifically, the relative strength of the channels both in the short-run and the long-run is examined explicitly. The matter of dynamic analysis, including impulse response functions (IRF)

and variance decomposition (VD) are later focused in this chapter to investigate for a shock from economic growth to the movement of stock markets.

Understanding the properties of the forecast errors is helpful to determine interrelationships among variables in the system. The estimated model of this study is based on VAR model, while the data is collecting from the Datastream database, nation's statistics department and the central bank report. Followed by the economic procedures which are important aspects to consider while estimating the time series data, the study use two basic procedure tests namely unit root tests and cointegration test. Both of these tests prove the existence of a stable long-run linear relationship among the variables. The last section briefly explains the diagnostic tests for the time series modeling, for instance, autocorrelation test, heteroskedasticity test, normality test and parameter stability test. These tests are important for the time series modeling because it determines the goodness-of-fit of the model estimated.

4.2 Theoretical Framework of Stock Market and Economic Growth

The link between finance and growth received less attention from economists until the early twentieth century when the German economist Schumpeter (1911) observed that banks and other financial institutions can contribute to economic growth by channeling funds from savers to borrowers in an efficient way to facilitate investment in physical capital. He contends that banks are viewed as key agents in facilitating these financial intermediating activities and promoting economic development. The notable early works on finance and growth along the Schumpeterian lines include Gurley and Shaw (1955) and Goldsmith (1969). They argue that the development of a financial system is important in stimulating economic growth and underdeveloped financial systems will retarded the economic growth. While, studies of Shaw (1973) emphasized that the ability of the financial system in mobilizing savings and investment can contribute to economic growth. This view clarifies that financial development cause economic growth.

Pagano (1992) provides an instructive and simple model that shows how growth may be influenced by financial factors in new growth theory approaches. His model consists of three basic equations. The first equation presents aggregate output is a linear function of aggregate capital stock: $Y_t = AK_t$. Where A is stands for the marginal productivity of capital K, which in this case, denotes a combination of physical and human capital. The second equation describes gross investment I in capital K that depreciates at the rate δ per period: $I_t = K_{t+1} - (1- \delta)K_t$. The equation assumes the economy is a closed economy without government intervention. The capital market equilibrium requires that gross saving (S) equals gross investment (I) in any period. Since the saving (S) is needed to organize the process of financial intermediation, the growth rate of the described economy can be expressed as: $g_{t+1} = Y_{t+1}/Y_t - 1 = K_{t+1}/K_t - 1$. That is, after dropping the time indices, the equation can be

written as: $g = A(I/Y) - \delta = A\theta(I/Y) - \delta$. This equation is now used to explain how financial development can affect growth in the endogenous growth theory framework. First, it can raise θ, which means that less money is 'lost' in the financial sector due to an increase in efficiency in the intermediation process. Second, it may increase the productivity of capital A, through various channels. Particularly, financial institutions are supposed to screen and monitor investment projects and reallocate risk among economic agents and by that increase overall capital productivity as the help to funnel saving to the most productive investment projects. Third, financial development may influence the saving rate (S/Y). It can induce people to save less. As more efficient risk allocation reduces the need for precautionary saving or because it relaxes liquidity constraints as more credits are made available. He elucidates how stock market development could affect economic growth through savings and investment. Savings and investment play an important role in economic growth and development, as saving determines the country's capability for investment and hence, for production. This in turn affects the potential of economic growth.

Thus, to illustrate the stock market and economic growth channels through, this study select four theories that can explain the indicators of stock market, banks, real estate, real output, money supply, interest rate, inflation and exchange rate. These theories are the quantity theory of money, the loanable funds theory, liquidity preferences theory, Mundell-Tobin effect and Van Wijnbergen *IS-LM* model.

4.2.1 Quantity Theory of Money

Keynes's theory demand for money was specifically designed to apply at the macroeconomic level. The extension of the quantity theory by Milton Friedman (1956) treats the demand for money in the same way as the demand for any assets yielding a flow of services. Friedman states that anyone who holding money has to forgo the services of the alternative assets he could buy with money. These forgone yields measure the opportunity cost of holding money. The normal demand theory assumption states that, there exist diminishing marginal rates of substitution between assets, so that the more of any assets held, the less valuable its marginal services relative to the services yielded on the assets become. Equilibrium is established where the marginal rates of substitution is equalized and there is no advantage to be gained from a further division of one's wealth.

According to Friedman, there are constraints on the quantity of assets that may be held by any individual, and this must be given by his wealth. A person can sell a claim on this potential income stream and hold the proceeds in money. Wealth is therefore viewed as the present value of the discounted flow of permanent income, Y^p, because it is maintainable income, so, $= \frac{Y^p}{r}$. The main alternatives to holding money according to Friedman are bonds, equity and physical goods. Other important factors that influence the alternative of holding money are non-human to human wealth, taste and preference. Each of these factors is explain as below.

4.2.2.1 Bonds

The yield can be divided into two parts: (i) coupon payment, r_b; and (ii) any capital gain or loss resulting from a rise or fall in the price of the bond. Thus, the total yield is $r_b - \frac{1}{r_b}\frac{dr_b}{dt}$.

4.2.2.2 Equity

In this case the yield can be separated into three different parts. First, a constant nominal amount of, r_e, which would be paid as long as there is no inflation. Second, any divergence from this rate due to inflation which completes compensation is assumed, for instance, the return is assumed to keep pace with inflation $\frac{1}{P}\frac{dP}{dt}$. Third, an adjustment for any change in the nominal price of equity over time, $\frac{1}{r_e}\frac{dr_e}{dt}$ is analogous to the capital gain adjustment on bonds. So, total yield $=r_e + \frac{1}{P}\frac{dP}{dt} - \frac{1}{r_e}\frac{dr_e}{dt}$.

4.2.2.3 Physical Goods

The yield on these is similar to that on equities except that the return is in kind rather than in money, and like equities this is also function of changes in the price level. Because the yield is in kind and not measurable in money terms, it is assumed that the real yield is constant so that the nominal yield will be determined by the rate of inflation plus constant real yield: $\frac{1}{P}\frac{dP}{dt}$.

4.2.2.4 Wealth

The budget constraint is: *Y*/*r*. The ratio of non-human to human wealth, *h* is included because the markets in human and non-human wealth are very different. A high degree of substitution is assumed between items of non-human wealth, *nhw*, and only limited substitution between categories. The major exception is investment in education at the sacrifice of higher current earnings, or at the cost of some existing assets, $h = \frac{nhw}{hw}$.

4.3.2.5 Taste and Preferences

This factor is assumed to be fixed. However, Friedman does expect the demand for money to rise with the degree of geographical mobility (increases in war time) or

with increases in uncertainty. By bringing all these factors of bonds, equity, physical goods, wealth, taste and preferences, the demand for money function model can be written as:

$$Md = f(P; r_b - \frac{1}{r_b}\frac{dr_b}{dt}; r_e + \frac{1}{P}\frac{dP}{dt} - \frac{1}{r_e}\frac{dr_e}{dt}; h; \frac{Y}{r}; u) \quad (4.1)$$

The next step is to simplify the model above. The function is assumed to be homogenous of degree one in prices and income, because the demands are real and therefore independent in any essential way of the nominal units used to measure money variables (Friedman, 1956, p. 58). This simplified equation can be written as:

$$Md = f(P; r_b; r_e; \frac{1}{P}\frac{dP}{dt}; h; u; Y) \quad (4.2)$$

This model presents the old quantity theory of money and as an alternative to the Keynesian approach to money demand. This model emphasizes that wealth and inflation are seen as an important determinant of demand for money.

A central implication of the quantity theory of money is that a given change in the rate of money growth induces an equal change in the inflation rate. This view prompts Friedman (1963a, p.17) claim that "inflation is always and everywhere in a monetary phenomenon"[10]. A crucial assumption behind this claim is that the velocity of money or its growth rate is constant and money growth has no effect on economic growth. As quantity theory of money says that quantity of money determines the value of money, it forms the cornerstone of monetarism. Monetarists say that a rapid increase in money supply leads to a rapid increase in inflation. Money growth that surpasses the growth of output will lead to inflation. In order to curb inflation, money growth must fall below growth in economic output. This assumptions leads to how monetary policies is administered. Monetarists believe that money supply should be kept within an acceptable bandwidth, so that levels of inflation can be controlled.

[10] Friedman, Milton "The Counter-Revolution in Monetary Theory". Wincott Memorial Lecture, London, September 16, 1970.

Thus, the monetarists agree that an increase in money supply can stimulate economy and in turn, increased the production of output.

The empirical study on "quantity theory of money" suggests that monetary policies could affect stock prices through the portfolio choice of investors (Brunner, 1961; Friedman, 1961; Friedman and Schwartz, 1963). When the real money balance increases as a result of an expansionary monetary policy, investors will responds to the wealth effect of increased money growth by exchanging money for other assets including common stocks. The increasing demand of stocks thus will push up stock prices. In the context of mainstream macroeconomic theory, the effect of the increase in the money supply will be fully absorbed by the price level in the long-run. The resulting increase in the price level may stimulate inflationary expectations in the economy, which has a positive effect on the nominal interest rate. A higher nominal interest rate will affect the choice of portfolios to be held in terms of money balances since the nominal interest rate measure the opportunity cost of holding money. In this case, investors are motivated to substitute money with other financial assets.

4.2.2 The Loanable Funds Theory

The models of interest rate determination have been studied extensively. There are two of the most influential theories that explain the level of real interest rates in an economy. The theories are the loanable funds theory and liquidity preference theory. This Irving Fisher's classical approach of loanable funds and liquidity preference theory is developed by John M. Keynes. The 'loanable funds' refers to the sums of money offered for lending and demanded by consumers and investors during a given period. According to Fisher, individuals may either consume or save their income. The individuals may savings when they consider future consumption as preferable to current consumption, so, they will consume less now to be able to consume more in the future.

In the loanable funds model, the level of interest rates is determined by the supply and demand of loanable funds available in an economy's credit market. This theory suggests that investment and savings in the economy determine the level of long-term interest rates. Short-term interest rates, however, are determined by an economy's financial and monetary conditions. According to the loanable funds theory, demand for loanable funds is equal to the net investment plus the net additions to liquid reserves, while, the supply of loanable funds is equal to net savings plus money supply increase.

In the loanable funds model, the factors that affecting saving decisions is differ amongst individuals. The first factor is income. With higher income individual may save more, though the decision to save is determined not only by the level of income, but also by expectations about future income, marginal propensities to consume and save. However, these preferences may change after change in the level of income. The second factor is the compensation that individuals earn to lend his savings to other individuals. The amount of compensation or payment paid is determined by the interest rate. The higher the interest rate, the more opportunities the individual uses, and the more available savings that he will save. Interest rates are positive if there is a demand for savings from the borrowers. The borrower is willing to loan his savings if there is a profitable opportunity of investment. The cost of funds for borrowers is interest rate. The more interest rates, the fewer borrowers will invest, so investment is negative function of interest rates. The borrower will be willing to invest as long as the marginal benefits of the investment are equal to the marginal cost, or interest rate.

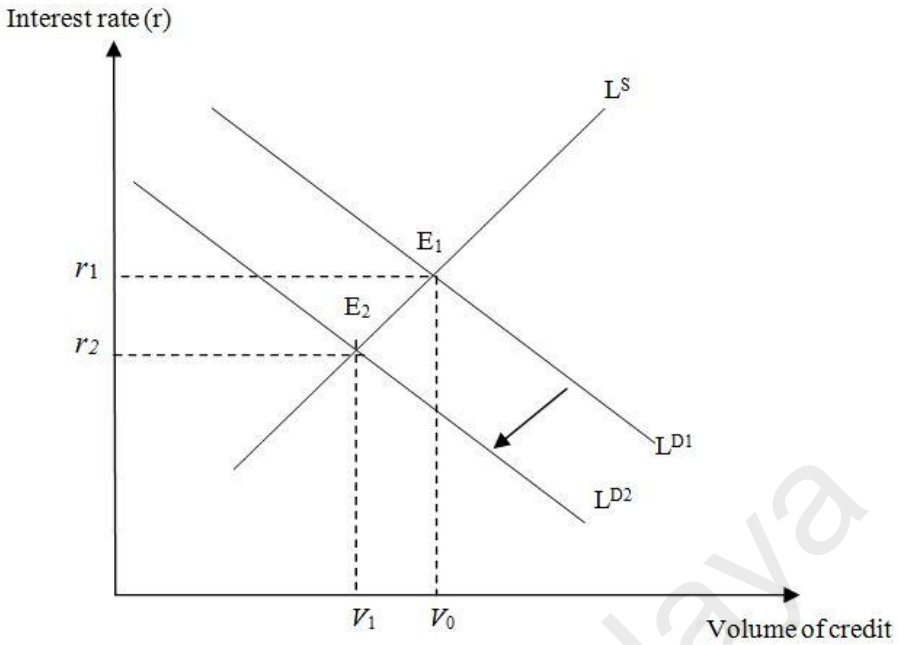


Figure 4.1: The Loanable Funds Model

Figure 4.1 represents the loanable funds model, which shows the effect of a decline in consumer borrowing. The L^D represents the demand for loanable funds, or the amount of funds that firms and individuals wish to borrow at each interest rate. The demand curve slopes downward because at a lower interest rate, firms and individuals can borrow money more cheaply. The lower cost of loans encourages a higher quantity of borrowing. The L^S curve represents the supply of loanable funds, or the amount that individuals wish to save. The supply curve slopes upward because at a higher interest rate, individuals get a higher return on their money and are willing to save more. The point at which the supply and demand curves intersect is called the market equilibrium, and is marked E_1 in Figure 4.1. At this point, the quantity of loanable funds demanded exactly equals the quantity supplied. This means that at the equilibrium interest rate, there are just enough people saving (supply) to match up with the desire for borrowing (demand). However, reduced in consumer confidence have an effect on consumer lending, which shows the decline in consumer borrowing. Suppose consumers thought that current consumer debt

levels were too high and they react by cutting back on their use of credit. This would be shown as a shift to the left of the demand for credit from L^{D1} to L^{D2}. This by itself would result in a decline in interest rates and a lower volume of credit, as shown in Figure 4.1.

4.2.3 Liquidity Preferences Theory

In macroeconomic, theory liquidity preference refers to the demand for money considered as liquidity. The concept was first developed by John Maynard Keynes in his book "the general theory of employment, interest and money"[11] to explain determination of the interest rate by the supply and demand for money. Mathematically, the demand for money is defined by the following equation:

$$M^d/P = f(r, Y) \tag{4.3}$$

Where, M^d representing demand for money and P is the price level. Real money balance (M^d/P) is a function of the interest rate (r) and the real output (Y). According to the liquidity preference theory, the interest rate should be reduced to eliminate the excess of money supply. This means interest rate must be lowered. The decreases of the interest rate will increases investment and increases output. As real output increases, money demand increases together with the reduction of the interest rate that contributes to the reduction the excess of money supply in the money market.

However, when the goods market is unstable and uncertain, money supply targeting is more suitable. If the central bank is pursuing monetary targeting, it will cause the interest rates to rise at a given money supply target. The increase in interest rates will result investment spending and net exports declines, thereby depreciate the value of the local currency and reducing aggregate output (Campa and Goldberg,

[11] Keynes, J. M. (1936). The general theory of employment, interest and money London: Macmillan.

1999; Smal and De Jager, 2001). However, the rise in money supply reverses the process. It causes a decrease in interest rates and increases aggregate output. The empirical studies that support this view include Campa and Goldberg (1999) and Smal and De Jager (2001). In the study of Campa and Goldberg (1999) shows that the positive effects of home currency depreciation lead to increase in investment, this in turn increases the share of industrial exports, reducing imported inputs and thereby increasing the actual output. Meanwhile, Smal and De Jager (2001) find that changes in monetary policy action affect the value of currencies, level of real economic activity, and the domestic price level (inflation).

According to Keynes there are three motives for holding money. The first is as a transaction motives. The transaction motives relates to the desire of households and firms to keep a certain amount of cash in hand. The higher the income, the more money demanded, thus, increase household spending. This relationship is refer to $M^d/P = f(Y)$. The second is, as precautionary motives. The precautionary motives relates to the desire of households and business concerned to hold cash for unexpected problems that need unusual costs. The transaction of precautionary motives for holding cash depends upon income. The demand for money depends upon $M^d/P = f(Y)$, which means that the liquidity preference of precautionary motives is a function of income. The third is, as speculative motives. The speculative motives relates to the desire of the households and firms to keep a portion of their resources in ready cash in order to take advantage of changes in the interest rates. If people expect a rise in the rate of interest in the future, they will try to hold money in cash in order to lend it in the future. Conversely, if they expect a fall in the rate of interest, they will invest money to gain advantages of the high rate of interest. An expected rise in interest rate stimulates liquidity preference and an expected fall has the opposite effect. Thus the lower the interest rate, the more money demanded and

vice versa. The liquidity preference for speculative demand for money is a function of expected changes in the rate of interest $M^d/P = f(r)$. These three motives of holding money can be described as in the Figure 4.2 and Figure 4.3 as follows.

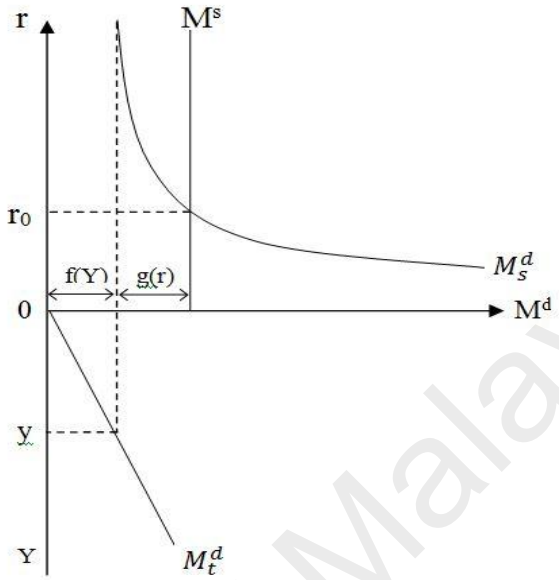


Figure 4.2: Speculative and Transaction/Precautionary Demands

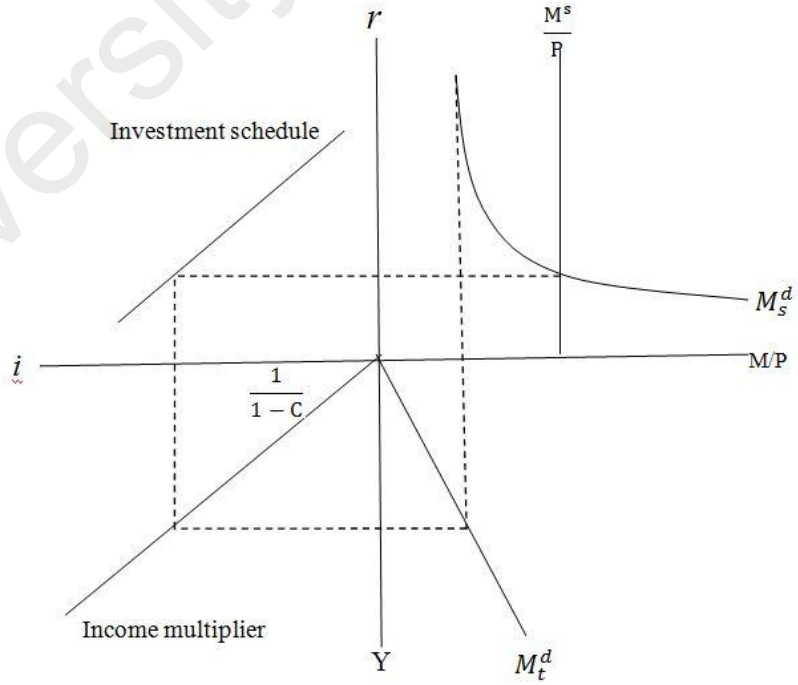


Figure 4.3: Determination of the Demand for Money
(Complete Model of the Money)

An increase in the interest rate implies a reduction in the demand for money. In this way, we can derive an aggregate demand for speculative balances schedule that slop downwards as a function of the rate of interest (on bonds). This relationship is likely to be convex to the origin, since the further the interest rate moves away from what is considered normal, the greater the percentage of people who will expect it to move back (Figure 4.2). Since, there are two separate demands for money: (i) the speculative demand as a function of the rate of interest; and (ii) the transactions or precautionary demand determined by the level of income. To reach the equilibrium level, demand for money must be equal to the supply of money. There may, in fact, be some overlap between these demands, but the amount of cash which individual decides to hold to satisfy the transactions and precautionary motives is not entirely independent of what he is holding to satisfy the speculative motive. Thus, it is a safe first approximation to regard the amounts of these two motives of holding money as being largely independent of one another. These two motives (speculative and transaction) of holding money is represented in Figure 4.3.

The transactions, precautionary, and speculative demands for money vary negatively with the interest rate. Putting those three sources of demand together, we can draw a demand curve for money to show how the interest rate affects the total quantity of money that people hold. As shown in Figure 4.3, the quantity of money people want to hold varies according to their income and the interest rate. This is because the different average quantities of money held can satisfy their transactions and precautionary demands for money. For example, a household is more likely to adopt a bond fund strategy when the interest rate is higher. At low interest rates, a household does not sacrifice much income by pursuing the simpler cash strategy. As the interest rate rises, a bond fund strategy becomes more attractive. That means that the higher the interest rate, the lower the quantity of money demanded.

4.2.4 Mundell-Tobin Effect

Tobin's q theory of is one theoretical approach to the explanation of this sluggishness in investment (Tobin, 1969). The theory gives a remarkably simple operational macroeconomic investment function, in which the key variable explaining aggregate investment is the valuation of the firms by the stock market relative to the book value of the firms' physical capital. Tobin argues that the net effect of the current state of economy and interest rates on business investment can be gauged by the level of stock prices, specifically by the value of Tobin's *q*, the ratio of the value placed on firm by financial markets to the replacement cost of its assets:

$$q = \frac{market\ value\ of\ firm}{replacement\ cost\ of\ firm's assets}$$

As in the expression for market capitalization ratio, $mk_t = \frac{P_t^z}{y_t}$, in the expression for Tobin's q , $q_t = \frac{P_t^z}{k_{t+1}}$, p_t^z represents the aggregate stock price index for the economy which is stock price times number of outstanding shares, and k_{t+1} represents the end of period capital stock. Mk_t is measured by the total market value of assets over the book value of assets, p_t^z is the market value of debt and equity, while y_t is the replacement cost of the firm capital at time *t*. Tobin's q is an important indicator of the health of the stock market in an economy, with q_t greater than unity implying that the market is overvalued and q_t less than unity implying that it is undervalued.

The link between Tobin's q and business investment is provided by the observation that business expansion only benefits shareholders if the rate of return that the firm can earn on its investment is larger than shareholders required rate of return. This is one of the primary ways in which financial markets affect real economy activity. When interest rates are low, so are shareholder required returns,

making it more likely that prospective investment are sufficiently profitable to justify making them on behalf of shareholders.

The Mundell-Tobin effect (Mundell, 1963, and Tobin, 1965) refers to the idea that higher inflation reduces demand for money and increases demand for interest-bearing assets. Therefore, the required return on bonds and/or marginal productivity of capital falls and the real interest rate declines. The Tobin (1965) effect implies that an increase in inflation also increases the capital stock and economic growth. The Mundell–Tobin effect suggests that nominal interest rates would not rise less than one-for-one with inflation because in response to inflation, the public would hold less in money balances and more in other assets, which would drive interest rates down. In other words, an increase in the exogenous growth rate of money increases the nominal interest rate and velocity of money.

In the classical dichotomy, a rise in inflation raises the nominal interest rate, and lowers real money balances. Henceforth, the decline in real balances will lower consumption, rise the saving and lead to a drop in the real interest rate to bring saving into line with investment. The drop in the real interest rate offsets some of the initial rise in the nominal interest rate. The end result is that the nominal interest rate rises by less than one-for-one with inflation.

The *IS-LM* and *AD-AS* graph in Figure 4.4 and Figure 4.5 illustrate the essence of the differences between the effects of Fisher and Mundell-Tobin. Figure 4.4 illustrates the situation of an increase in the money supply with respect to interest rate. To analyze the increase of money supply we can use the real money balance model to clarify this relationship.

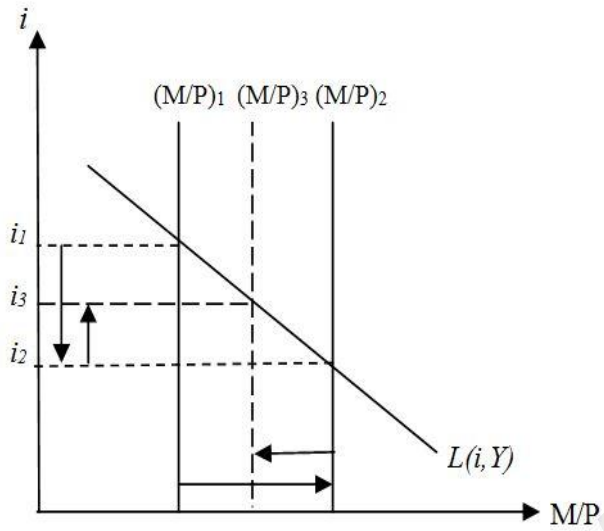


Figure 4.4: The Money Market Equilibrium

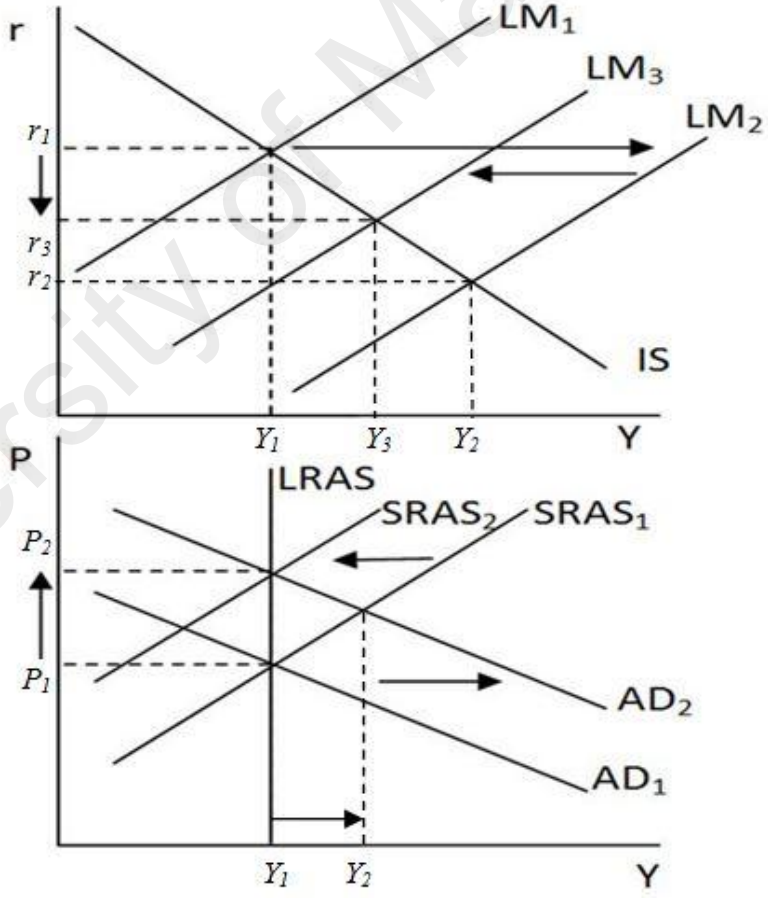


Figure 4.5: Equilibrium in the Aggregate Demand-Aggregate Supply Model

As represented in Figure 4.4 and Figure 4.5, the *AD* curve downward slope due to the higher price level is associated with lower real money supply (M/P), thus shifting *LM* curve to the right, increases the real interest rate, and lower the demand for output. Consider the situation when the aggregate demand curve shifts to the right from AD_1 to AD_2, as shown in Figure 4.5. The immediate of short-run effect caused the equilibrium price level increases from P_1 to P_2, and real GDP increases above its natural level, from Y_1 to Y_2. The increase in real GDP is due to the fact that input prices have not risen in response to the rise in price level of final goods which the economy is still operating along the $SRAS_1$ curve. However, input provider will demand higher prices to reflect the increase in the general price level. Production costs will therefore increase, and the supply of real GDP will decrease. This can be demonstrated by the shift of *SRAS* curve from $SRAS_1$ to $SRAS_2$.

The graphical analysis presented in Figure 4.4 and Figure 4.5 represents that higher inflation lead to rise in *r*. This means that, as refer to the real money balance diagram, if the money supply decreases, the interest rate is higher at level of Y_1, therefore, the *LM* curve shifts to the left. This means that, we would have to shift $(M/P)_2$ left to $(M/P)_3$ which would shift the *LM* curve leftwards (Figure 4.4). However, if *r* fall at the same time as inflation rise it cannot be possible for *i* to rise at the same pace as inflation. Hence, this can be concluded that the Fisher effect may not always hold as a useful rule of thumb and that sometimes the nominal interest rate will increase on a less than one-for-one basis with inflation, which refers as Mundell-Tobin effect.

There is a distinction between nominal and real interest rates. Fabozzi, Modigliani and Ferri (1998, p.201) determine nominal interest rate as the number of monetary units to be paid per unit borrowed and real interest rate as the growth in the power to consume over the life of a loan. If there is no inflation in the economy, there would

be no difference to individuals whether interest rate is nominal or real. Fisher is one of the first developers of the theory of interest rates and introduced this distinction. During inflation, the nominal interest rate exceeds the real interest rate and during deflation, the real rate exceeds nominal rate. Fisher insists that, in the long-run the real interest rate is constant and expectations of inflation only affect nominal interest rates. Fisher's theory is very general and does not take into account many factors influencing the level of interest rates. The loanable funds theory that discussed previously extends Fisher's approach on the demand and supply for credit, such as loans, bonds or savings deposits.

4.2.5 Van Wijnbergen Model

Van Wijnbergen (1982, 1983a, 1983b, 1985) stresses the importance of incorporating the curb or unorganized money markets in monetary models of developing countries. His first published articles applies the model to Korea, the only developing economy for which time-series data on the volume of curb market loans as well as curb market interest rates apparently exist.

The model Van Wijnbergen uses to analyze the effects of financial liberalization starts with Tobin-type portfolio behavior on the part of the household sector (Van Wijnbergen 1983a, p. 435-436). Households allocate their real wealth *W* between currency *E*, time deposits *D*, and direct loans to the business sector through the curb or unorganized money market L_h, all expressed in real terms:

$$E = f^e(\pi, i, r_d, y)W \tag{4.4}$$

$$D = f^d(\pi, i, r_d, y)W \tag{4.5}$$

$$L_h^s = f^L(\pi, i, r_d, y)W \tag{4.6}$$

Where π is the inflation rate, i is the nominal curb market rate of interest, r_d is the real time deposit rate of interest, and y is income. Since demands for currency and

time deposits are positively related to income, the household sector's supply of funds to the curb market is negatively related to income, given the level of wealth.

The cash base, consisting of currency in circulation and bank reserves (banks are subject to a required reserve ratio 1-q against time deposits), is not backed by any private sector assets but is created through transfer payments (Van Wijnbergen 1983a, p.436). Banks supply loans in real terms L_h^S to the business sector depending on their demand for excess reserves, the level of deposits and the required reserve ratio:

$$L_h^S = b(\pi, r_L)q.D \tag{4.7}$$

Where r_L is the bank lending rate in real terms. The nominal bank lending rate is fixed by the government below its equilibrium level, in contrast to the curb market interest rate, which is free to find its market-clearing equilibrium level. Consider the following equation, where firms' demand for loans is determined by the real product wage and output: $L^d = L(w, y)$. Loan demand is completely inelastic with respect to the curb market rate of interest. Thus, the equilibrium in the curb market is expressed as follows:

$$f^L = f^e(\pi, i, r_d, y)W = L(w, y) - b(\pi, r_L)q.f^d(\pi, i, r_d, y)W \tag{4.8}$$

Differentiating equation above gives the upward-sloping *LM* curve represents in figure above. Whereas, a simple Keynesian output equation of $y = A(i\text{-}\pi, y)$, $Ai < 0$, $0 < Ay < 1$, yields the *IS* curve as shown in Figure 4.6.

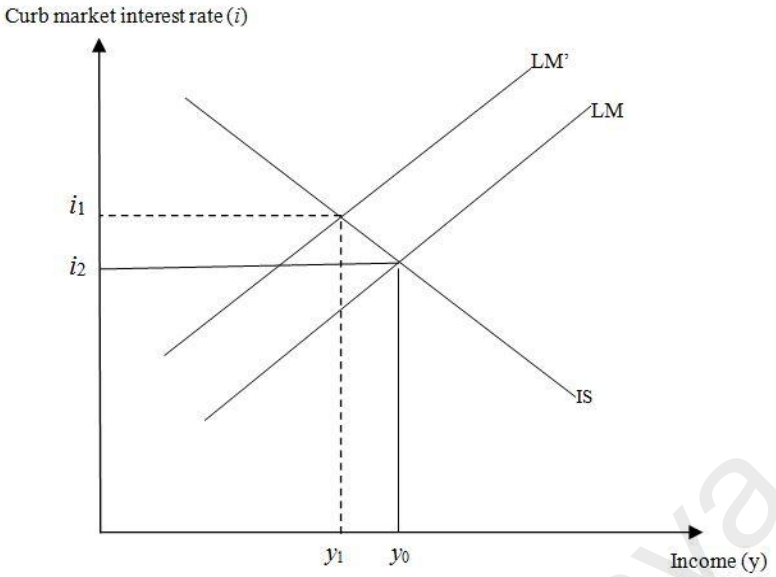


Figure 4.6: IS-LM Curves in Van Wijnbergen's Model[12]

The Figure 4.6 shows that a change in the time deposit rate has no effect on the goods market. Therefore, *IS* curve does not shift. The money market is subject to two effects. First, a higher time deposit rate increases money demand and shift the *LM* curve upwards. Second, substitution out of currency and into time deposits increases the money supply (the money supply multiplier raises with the decline in the currency/deposit ratio) and hence shifts the *LM* curve downwards.

The shifts in the LM curve depends on the required reserve ratio and the relative elasticity demand for currency and curb market assets with respect to the time deposit rate. If people substitute from curb market loans into time deposits after a rise in the time deposit rate, the total supply of funds to the business sector declines. This follow from the assumption that the curb market provides one-for-one intermediation, whereas banks provide only partial intermediation due to the reserve requirement (Van Wijnbergen, 1983a, p. 438-439). In this case, the *LM* curves shifts to the left, the curb market rate rises and output falls. However, if people substitute

[12] Sources: Coghlan, R. (1980). The theory of money and finance. London: Macmillan.

currency into time deposits after a rise in the time deposit rate, the total supply of funds to the business sector will increase, the *LM* curves shifts to the right, the curb market rate falls and output goes up.

Taylor also analyzes the effect of an increase in the time deposit rate when households hold gold, bank deposits and curb market loans (Taylor, 1983, p. 98-103). He examines the effects of monetary contraction using a model in which *Y* is determined by the available fixed of capital *K*: $Y = \sigma K$. When output can be decomposed into labor, capital and interest cost, the following equation can be written as follows:

$$PY = (1 + i)\omega N + rPK \tag{4.9}$$

Where P is the price level, i is the nominal curb market interest rate, ω is the nominal wage rate, N is the quantity of labor, and r is the profit rate. In this model, labor and all other current inputs are paid for in advance. Hence the interest cost of working capital is $i\omega N$.

In Taylor's two assets model, the growth rate of the capital stock (investment) depends on the difference between the profit rate and the curb market interest rate. Which can expressed in real terms as: $g = g_0 + h[r - (i - \pi)]$. Substituting the growth rate of the capital stock (investment) equation into the price level equation of $P = \frac{\delta\omega(1+i)\beta}{(\sigma - r)}$, the final expression for the price level can be written as:

$$P = \frac{(s-h)\delta\omega(1+i)\beta}{[s-(h+\gamma)]\sigma - g_0 + h(i-\pi)} \tag{4.10}$$

Equation 3.10 shows that an increase in the curb market rate will raise the price level through working capital cost push but lower the price level by reducing investment demand. When the price level is dominating, interest rate increases will reduce the rate of economic growth, provided the profit rate saving increase is more than it affects investment (Taylor, 1983, p. 91). Thus, as shown by equation below, equilibrium in the goods market (*IS* curve) can be expressed as:

$$\frac{(s-h)\delta(1+i)\omega\beta}{P} = h(i-\pi) + g_0 - [s-(\gamma+h)]\sigma = 0 \qquad (4.11)$$

As shown in Figure 4.7, Taylor illustrates the case where the price level rises in response to higher curb market rates. An increase in price level raises the nominal value of firms' fixed capital. This unexpected profit stimulates investment, and firms demand more loans. Resources are drawn into the curb market from deposits through a higher interest rate. Hence, the loan market equilibrium curve in Figure 4.7 is upward sloping. According to Taylor (1983), when a tight monetary policy is pursued or when the money demand function shifts upwards, the commodity market equilibrium curve shifts to the right. The result is an increase in the curb market rate of interest, a decline in investment, and a fall in the rate of economic growth. In the short-run, monetary contraction drives up the price level, reduce output, and increases unemployment.

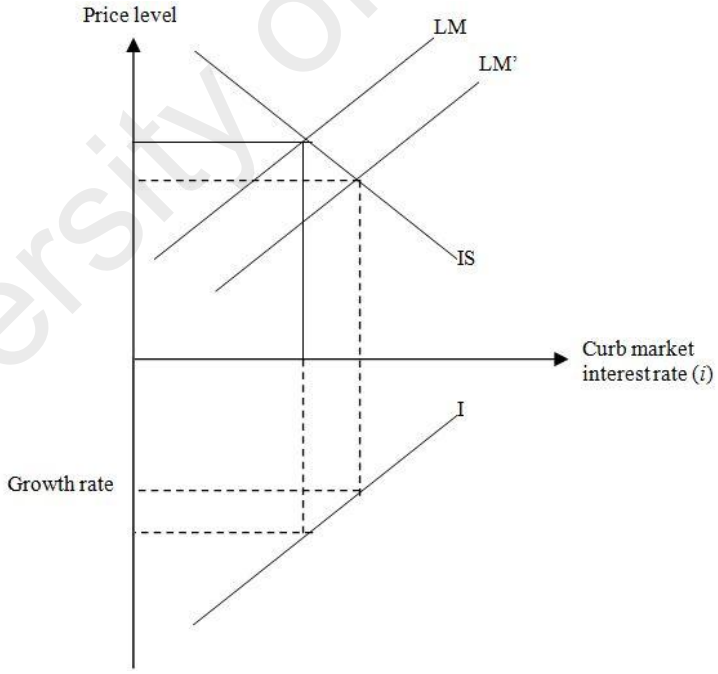


Figure 4.7: Short-Run Equilibrium in Taylor's Two-Asset Model

In Taylor's full model households hold bank deposits, curb market loans, and gold. Using a Tobin-type portfolio framework similar to model constructed by Van Wijnbergen, Taylor (1983, p. 94) shows that equilibrium in curb market is:

$$\omega\beta\sigma K - \frac{H}{1-q} + \varphi(i, i_d, \pi, \pi_z)(H, PK + P_z Z = 0 \qquad (4.12)$$

Where *H* is the cash base, *1-q* is the required reserve ratio, π is the inflation rate, π_z is the rate of change in the price of gold, and *Z* is the quantity of gold held by the household. Equation 4.12 above is represented by the loan market equilibrium curve in Figure 3.8. Here the commodity market equilibrium condition is depicted as a downward sloping curve.

Figure 4.8 shows the effects of an increase in the deposits rate of interest which increases money demand when the increase comes mainly from substitution out of curb market loans. In this case, when the general price level and the price of gold fall, investment and growth both decline. Taylor's short-term decision was somewhat similar to Van Wijnbergen. If aggregate demand effects dominate supply after an increase in the deposit rate, the inflation rate declines but real wages rise due to a lagged indexing system. The rise in real wages reduces the profit rate, investment and growth.

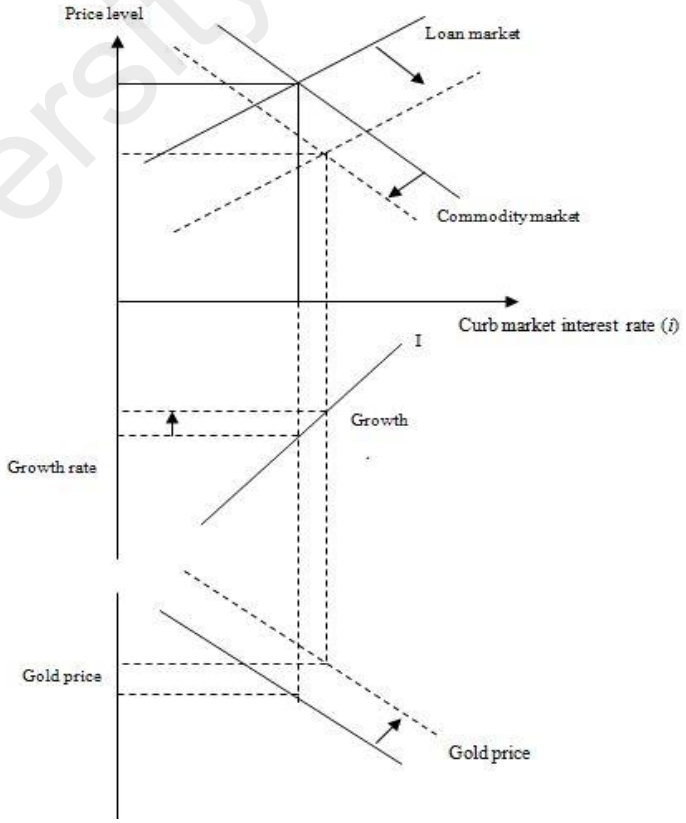


Figure 4.8: Short-Run Equilibrium in Taylor's Three-Asset Model

4.3 Finance-Growth Transmission Mechanism

This section reviews the theoretical foundations of the finance and growth transmission channels. Understanding the channels that runs from real sector to the financial sector is important for the most part standard macroeconomic theory. Since the study examines sectoral indices of stock market, banking and real estate, this section will explain how these three sectors affect economic growth. The study on financial and non-financial sectoral indices is very useful in helping policymakers understand the synergies between finance and growth in respond to monetary policy action.

4.3.1 Stock Price Channels

There are two important channels involving stock prices and economic growth: these involve Tobin's q theory of investment and wealth effects on consumption (Van Wijnbergen model). Tobin's *q* theory provides a mechanism by means of which stock prices affects the economic growth through its effects on the valuation of equities (Tobin, 1969). Tobin defines *q* as the market value of firms divided by the replacement cost of capital. If *q* is high, the market price of firms is high relative to the replacement cost of capital, and new plant and equipment capital is cheap relative to the market value of business firms. Companies can then issue equity and obtain a high price relative to the cost of the plant and equipment they are buying. Thus investment spending will rise because firms can buy a lot of new investment goods with only a small issue of equity.

Tobin's *q* theory of investment discusses the link between Tobin's *q* and investment spending. This can be explained through monetary policy affect on equity prices. When the money supply rises, the public finds it has more money than they wants, so they try to reduce the holdings of money by increasing their spending in the stock market. This in turn increases the demand for equity and consequently

raising the share prices. From another point of view, a fall in interest rates stemming from expansionary monetary policy making bonds less attractive relative to equities, thereby causing the price of equities to rise. The rise in equity prices (P_e) will lead to a higher market value of firms (q) and thus higher investment spending (I) which will then raise the output growth (Y). This process can be described by the following schematic:

$$Ms \uparrow \rightarrow r \downarrow \rightarrow P_e \uparrow \rightarrow q \uparrow \rightarrow I \uparrow \rightarrow Y \uparrow$$

The other alternative channel for financial transmission can be seen through wealth effects of consumption. In Van Wijnbergen model (1983a, p. 435-436), households allocate their real wealth between currency, time deposits, and direct loans to the business sector through the curb or unorganized money market. Since demands for currency and time deposits are positively related to income, the household sector's supply of funds to the curb market is negatively related to income at a given level of wealth. A major component of financial wealth is common stocks. The expansionary monetary policy can lead to a rise in stock prices. So, when stock prices rise ($P_e\uparrow$), the values of financial wealth will increases, thus increasing the lifetime resources of consumers, and in turn consumption could rise. Therefore, this process can be described as follows:

$$Ms \uparrow \rightarrow P_e \uparrow \rightarrow \text{wealth} \uparrow \rightarrow \text{consumption} \uparrow \rightarrow Y \uparrow$$

Both of the wealth and Tobin's q channels as discussed above can be described for general definition of equity. The Tobin q framework can apply in the housing market where the housing market is part of equity. An increase in house price raises the replacement cost, and this in turn leads to a rise in Tobin's q for housing, thereby stimulate its production. Similarly, housing and land prices (real estate) are an extremely important component of wealth, so rise in these prices increase wealth, and thus lead to a raise in consumption. In fact, the expansionary monetary policy

can also operates through land and housing price channels. Monetary expansion will lead to a rise in the price of land and housing market (P_h), and thereby leading to an increase in aggregate demand (Y_d) and a rise in output (Y). In other words:

$$Ms \uparrow \rightarrow P_h \uparrow \rightarrow Y_d \uparrow \rightarrow Y \uparrow$$

4.3.2 Bank Lending Channels

The bank lending channel is based on the view that banks play a special role in the financial system because banks act as the supply of loanable funds and driving force of bank lending. The idea manifested most clearly in conceptualizations of the bank lending channel of monetary transmission, as first expounded by Bernanke and Blinder (1988). Under this view, tight monetary policy is assumed to drain deposits from the system and will reduce lending if banks face frictions in issuing uninsured liabilities to replace the shortfall in deposits. Essentially, borrowers have no access to the credit markets unless they borrow from banks. According to Schumpeter (1911), banks and financial institutions can contribute to economic growth by channeling funds from savers to borrowers in an efficient way to facilitate investment in physical capital. He contends that banks are viewed as key agents in facilitating these financial intermediating activities and promoting growth. However, reduced in consumer confidence have an effect on consumer lending, which shows the decline in consumer borrowing. Suppose consumers thought that the current level of consumer debt is too high, they will respond by reducing their use of credit. This can be shown by the movement of demand for credit as represents in Figure 4.1. As long as there is no perfect substitution of bank deposits with other sources of funds, then the bank lending channel of monetary transmission operates as follows. The monetary expansion policy increases the reserves and bank deposits, which in turn leads to an increase in the quantity of available bank loans. Given banks' special role as lenders to classes of bank borrowers, this increase in loans will cause investment

spending to rise and lead to an increase in output. Schematically, the monetary policy effect is: Ms ↑ → bank deposits ↑ → bank loans ↑ → I ↑→ Y ↑

4.3.3 Real Estate Price Channels

As discussed in real estate research (Quigley, 2002), real estate is important for regional economic and financial cycles. In fact, real estate prices can affect the output of an economy through housing expenditures. A monetary expansion policy that goes with a decrease of the interest rate will lowers the costs of financing houses (debt financing becomes cheaper). With equal house prices, houses become relatively more expensive and the construction of new houses (H) becomes more attractive. As a result, housing expenditures (such as the construction of new houses) will increase and so aggregate demand will rise. Ms ↑ → P_{houses} ↑ → H ↑→ Y ↑

Specifically, when households have a large amount of financial assets relative to their debts, the probability of financial distress is low and they will be more willing to purchase houses. When stock prices raise, the value of financial assets rise, thus household's expenditure on housing will also rises because households have a more secure financial position and lower estimate of the likelihood of suffering financial distress. This leads to transmission mechanism for monetary policy operating through the link between money and equity prices as follows: Ms ↑→P_e ↑→financial assets ↑→ financial distress ↓→housing expenditure ↑→ Y ↑

4.4 The Estimating Model

The model used in this study was determined based on a vector error correction model (VECM) approach. VECM analyzes multivariate dynamic equations. The relationship between variables is estimated through the various lag regressors. In particular, the relative strength of the channels in the short and long-run are examined explicitly. The purpose of this study is to investigate the influence of stock market on growth, as well as to study the effect of the Asian and global financial crisis on ASEAN-5 economic growth. Furthermore, in order to investigate whether there is a long-run equilibrium and short-run dynamics between the stock market and economic growth, the study proposes a framework for cointegration analysis using the Johansen approach (Johansen, 1991, 1995). Since the cointegration test not able to detect the direction of these relationships, the Granger causal test is used to explore causal relationships between the underlying variables. Standard Granger causality test is conducted to examine the existence and direction of causality between non-cointegrated variables. To study the dynamic interactions among the variables in the VAR system, this study uses the impulse response functions (IRF) and variance decomposition analysis. It provides information on how a variable of interest respond to shock or innovation in other variables. Understanding the forecast errors is helpful in revealing the relationship between variables in the system.

Using an updated data set of 108 quarterly observations collected for the period from 1990Q1 to 2016Q4, a unique equation that represents the linkage among variables of interest was established. The rationale of variables selected for study will be subsequently explored, based on a variety of empirical findings from recent literature. The selection of sectoral stock market indices in this study consist of financial and non-financial index. The index of financial sector comprises of stock prices index and bank index, while the non-financial sector consist of real estate index. Other variables

included in the model are real gross domestic product (y), broad money M3 (m), interest rate (r), inflation (p), exchange rate (e) and dummy crisis variable (CRISIS97 and CRISIS08). Explanation on the model specification and sources of data is discussed as follows.

4.4.1 Model Specification

To examine the channels of stock market on economic growth and links the effects of financial crisis, the following model is used:

$$Y = f(SM, M, R, P, E)$$

Where *Y*, *SM*, *M*, *R*, *P*, *E* are: real gross domestic product, sectoral stock market indices, broad money (M3), interest rate, consumer price index (CPI) and exchange rate. The selection of sectoral stock market indices in this study consist of financial and non-financial index. The indices of financial sector comprises of stock prices index and bank index, while the non-financial sector consist of real estate index. The stock price index used in this study are Jakarta stock exchange (JKSE), Kuala Lumpur stock exchange (KLSE), Philippines stock market composite index (PSEi), Singapore stock exchange (STI) and Bangkok stock exchange (SET). The model presented above can be reformulated in the following alternative form of vector error-correction model (VECM) as follows:

$$\Delta y_t = \alpha + \sum_{i=1}^{\rho} \beta \Delta y_{t-1} + \sum_{i=1}^{\rho} \delta \Delta sp_{t-1} + \sum_{i=1}^{\rho} \tau \Delta m_{t-1} + \sum_{i=1}^{\rho} \theta \Delta r_{t-1} + \sum_{i=1}^{\rho} \eta \Delta p_{t-1} + \sum_{i=1}^{\rho} \psi \Delta e_{t-1} + \varphi crisis + \gamma ECT_{t-1} + \varepsilon_t$$

$$\Delta y_t = \alpha + \sum_{i=1}^{\rho} \beta \Delta y_{t-1} + \sum_{i=1}^{\rho} \delta \Delta bnk_{t-1} + \sum_{i=1}^{\rho} \tau \Delta m_{t-1} + \sum_{i=1}^{\rho} \theta \Delta r_{t-1} + \sum_{i=1}^{\rho} \eta \Delta p_{t-1} + \sum_{i=1}^{\rho_i} \psi \Delta e_{t-1} + \varphi crisis + \gamma ECT_{t-1} + \varepsilon_t$$

$$\Delta y_t = \alpha + \sum_{i=1}^{\rho} \beta \Delta y_{t-1} + \sum_{i=1}^{\rho} \delta \Delta res_{t-1} + \sum_{i=1}^{\rho} \tau \Delta m_{t-1} + \sum_{i=1}^{\rho} \theta \Delta r_{t-1} + \sum_{i=1}^{\rho} \eta \Delta p_{t-1} + \sum_{i=1}^{\rho} \psi \Delta e_{t-1} + \varphi crisis + \gamma ECT_{t-1} + \varepsilon_t$$

In this equation, *y*, *m*, *r*, *p*, *e*, *sp*, *bnk*, *res*, *crisis*, and *ECT* are represents the real gross domestic product, money supply, interest rate, inflation, exchange rate, stock price index, bank index, real estate index, dummy crisis and error-correction term. The error

terms, ε_t ($t = 1,\ldots, p$) are serially uncorrelated with mean zero. The *ECT* is obtained from the cointegration equation using the Johansen maximum likelihood procedure.

All the series are transformed into natural logarithmic forms before being applied in the econometric model. The purpose of transforming variables into natural logarithmic format is to handle highly skewed distributions. The advantage of using the log model is that it avoids the slope coefficients depending on the levels of the variables. In the log model, the slope coefficient is invariant to scaling. So, it removes or reduces the problem of heteroskedasticity. In addition, the log model usually narrows the range of variables, making estimates less sensitive to outlying observations of dependent or independent variables.

The short-run relationship is measured by the parameters β, δ, τ, θ, η, ψ and φ. The significance of the explanatory coefficients is measured by the *t*-statistics. The long-run information on the relationship between the variables is represented in ECT_{t-1} variable. The speed of adjustment to long-run equilibrium is measured by the γ ($\gamma < 0$). If all the variables are cointegrated, ΔY_t must be caused by ECT_{t-1}. That is, the change in the dependent variables is partly the result dependent variables moving into alignment with the trend value of independent variables. In other words, changes in the current values of the dependent variable are related to the changes in the independent variables from the long-run relationship. The significance of the adjustment coefficient is measured by the *t*-statistics. The negative value indicates the equation is moving to the equilibrium level.

In this study, dummy variable are introduced to capture the effects seasonal pattern in the series and also the event of financial crisis in 1997 and 2008. The inclusion of CRISIS97 and CRISIS08 is to trace out the changes in the channels due to the crisis. Adding dummy variables not only improves the fit of the model but also removes the effects of outliers to obtain better estimate of the residual (Doornik et al., 1998).

Dummy value of "one" is assigned to the period when the event takes place and dummy is "zero" in other period. It is the interest of this study to examine the effect of the financial crisis on economic growth via the channel of stock market, banks and real estate index. The coefficient of variables is expected negatively related to growth. The dummy is set as one (1) for the period of crisis and zero (0) for the period of non-crisis. For example, in the financial crisis event:

CRISIS97 = 1 for period 1997Q2 – 1999Q4 and

CRISIS97 = 0 for periods 1990Q1 – 1997Q1 and 2000Q1 – 2016Q4

CRISIS08 =1 for period 2007Q3 – 2009Q2 and

CRISIS08 = 0 for periods 1990Q1 – 2007Q2 and 2009Q3 – 2016Q4

In addition, seasonal dummy is also added to the model as a seasonal indicator or dummy variable that serve as regressors for seasonal effects. Many economic time series based on monthly and quarterly data exhibit seasonal patterns. Seasonality can be considered as a cyclical pattern where the cycle has a specific seasonal frequency corresponding to the fixed number of months or quarters. It is desirable to remove the seasonal factors from a time series so that one can concentrate on other components, such as the trends. A time series can contain four components, seasonal, cycle, trend, and one very random. The process of removing the seasonal component from a time series data is known as seasonal adjusted time series. The economic time series data such as the consumer price index (CPI) used in this study is usually published in the form of seasonal adjustments. Therefore, it suggests that there are seasonal patterns in data related to various quarters. In order to avoid dummy variable traps, the study assigning a dummy to each quarter of the year. If there is a seasonal effect on a given quarter, it will be shown by the statistically significant value of the dummy coefficient for that quarter. The seasonal dummies only affect the mean of the endogenous variables without changing the trend. To avoid perfect multicollinearity between

seasonal dummy and intercept, one of the seasonal dummy is dropped from the regression. These seasonal dummy can be included along with a constant (intercept) term in regression equation and their coefficients provide estimates of the first three seasonal effects. For quarterly observations, three relative seasonal dummies defined as SR1, SR2 and SR3 are entered in the regression (Pesaran and Pesaran, 1997, p. 42). Seasonal dummy variables may be defined as follows:

	SR1	SR2	SR3	SR4
Quarter 1	1	0	0	0
Quarter 2	0	1	0	0
Quarter 3	0	0	1	0
Quarter 4	0	0	0	1

4.4.2 Data Sources

This study intends to explain the relationship between eight variables, namely real output (Y – the real growth rate of gross domestic product), inflation (P – consumer price index), money supply (M – measured by broad money M3), interest rates (R – consisting of money market rate, interbank overnight money and 3-month interbank rate), exchange rate (E – represented by Rupiah/USD, Ringgit/USD, Peso/USD, Singapore dollar/USD and Baht/USD), stock market (SP – stock price index), bank index (BNK – commercial banking and financial services listed in stock exchange), and real estate index (RES – real estate companies listed in stock exchange). The variables used in this study are generated in detail as provided in Table 4.1.

Table 4.1: Definitions and Transformation of Macroeconomic Variables

Variables	Definitions of Variables	Transformation
Economic Growth	The real gross domestic product is used to measure the economic activity. It measured by the quarterly percentage change in the real GDP, that is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products.	$\Delta LY_t = \ln(Y_t) - \ln(Y_{t-1})$
Inflation	Measured by the quarterly percentage change in consumer price index, that is the cost to the average consumer of acquiring a basket of goods and services.	$\Delta LP_t = \ln(P_t) - \ln(P_{t-1})$
Money Supply	Measured by the quarterly percentage change in broad money M3. M3 = M2 + deposits placed with other banking institutions comprising of currency and coins, and deposits in checking accounts, savings accounts and small time deposits, overnight repos at commercial banks, and non-institutional money market accounts.	$\Delta LM_t = \ln(M_t) - \ln(M_{t-1})$
Interest Rate	Measured by the quarterly percentage change in interest rate. The interest rates used are money market rate for Indonesia, Philippines and Thailand, interbank overnight money for Malaysia, 3-month interbank rate for Singapore.	$\Delta LR_t = \ln(R_t) - \ln(R_{t-1})$
Exchange Rate	Measured by quarterly percentage change in exchange rate. Exchange rate can be defined as the price of one currency in terms of other currencies. The exchange rate used in this study consists of Rupiah / USD, Ringgit / USD, Peso / USD, Singapore dollar / USD and Baht / USD.	$\Delta LE_t = \ln(E_t) - \ln(E_{t-1})$
Stock Price	Share price indices are calculated from the prices of common shares of companies traded on national or foreign stock exchanges. The index is usually determined by the stock exchange, using the closing daily values for the monthly data, and normally expressed as simple arithmetic averages of the daily data. Stock market utilized in this study are consists of Indonesia, Malaysia, Philippines, Singapore and Thailand stock market index. The stock price index is a capitalization-weighted index of all the companies actively listed on the Jakarta stock exchange, Kuala Lumpur stock exchange, Philippines stock market composite index, Singapore stock exchange and Bangkok stock exchange. Stock returns can be computed as the quarterly percentage change of the stock market index.	$\Delta LSP_t = \ln(SP_t) - \ln(SP_{t-1})$

Table 4.1 continued

Bank Index	The bank index comprises commercial banking and financial services listed in stock exchange. The commercial bank segments include personal financial services, which focuses on servicing individual customers and small businesses by offering products and services that are extended to customers, including mortgages, credit cards, hire purchase and others. Whereas, financial services is engaged in the business of banking, life assurance, general insurance, asset management, investment holding, futures and stock broking. Returns on bank can be computed as the quarterly percentage change of the bank index.	$\Delta LBNK_t = \ln(BNK_t) - \ln(BNK_{t-1})$
Real Estate Index	The real estate index comprises the real estate companies actively listed in stock exchange. The companies primarily engaged in property investment, property development and construction, property management, investment trading, investment holding and management, and other property-related activities. For instance, property investment segment is engaged in the investments in residential and commercial properties, and investment in real estate investment trusts. Whereas, the property development includes the development of residential and commercial properties. Returns on real estate can be computed as the quarterly percentage change of the real estate index.	$\Delta LRES_t = \ln(RES_t) - \ln(RES_{t-1})$

The real GDP is used to measure the economic activity. For Indonesia, Malaysia and Singapore, the GDP are available at multiple constant prices. Indonesia GDP is released at constant prices 1973, 1983, 1993 and 2000. For Malaysia, the constant prices are available at 1978, 1987 and 2000, while Singapore available at constant prices 1968, 1985, 1995 and 2000. The other two countries, the GDP data are available at constant prices 1972, 1988 for Thailand and 1985 for Philippines. To obtain single constant price, a splicing method is used to transform the GDP data. The method is based on Fair (1998) and Berenson and Levine (1992). Brenson and Levine (1992) maintain that the price index chosen should reflect a recent base year but unaffected by drastic changes in technology and preferences so that it allows reasonable comparison. Therefore, the base year period for gross domestic product is 2000=100. The construction of data is given in Appendix A1.

The data are obtained from the following sources. The selected macroeconomic variables (GDP, broad money M3, interest rate, CPI and exchange rate) are gathered from the official websites of Department of Statistics Indonesia, Department of Statistics Malaysia, National Statistical Coordination Board of Philippines, Department of Statistics Singapore and Office of the National Economic and Social Development Board, Thailand. Meanwhile, the index of financial sector (stock prices index and bank index) and non-financial sector (real estate index) are derived from International Financial Statistics compiled by the International Monetary Fund (IMF) and Datastream International. The use of financial and non-financial index data is almost identical to the study by Alnajjar et al. (2010), and Evrensel and Kutan (2007). Alnajjar et al. (2010) uses data from the Amman stock exchange to identify the effect of the global financial crisis on the financial sector in banking, insurance, financial services and real estate sectors. Meanwhile, Evrensel and Kutan (2007) used financial and non-financial sectoral index of banks, insurance, investment, real estate, and financial companies to examine the effect of the IMF's negotiation and approval program on stock market.

The study used quarterly data covering the period 1990Q1 – 2016Q4 for Indonesia, Malaysia, Philippines, Singapore and Thailand. The data are analyzed using the statistical software of Microfit 5.0 and Eviews 9.0 (the most updated version until 2017). This software is equipped as an easy-to-use statistical, econometric, and economic modeling package. More specific, it is one of the most powerful programmes for time series estimation and forecasting, especially in time series analysis. The summary of data description is given in Table 4.2.

Table 4.2: Description on the Series

Variables	Indonesia	Malaysia	Philippines	Singapore	Thailand
Real GDP	GDP 2000=100 1970:1-2016:4	GDP 2000=100 1970:1-2016:4	GDP 2000=100 1970:1-2016:4	GDP 2000=100 1970:1-2016:4	GDP 2000=100 1970:1-2016:4
Stock Market	Stock Prices 1983:2-2016:4	Stock Prices 1980:1-2016:4	Stock Prices 1986:1-2016:4	Stock Prices 1985:1-2016:4	Stock Prices 1975:2-2016:4
	Banks 1990:1-2016:4	Banks 1986:1-2016:4	Banks 1990:1-2016:4	Banks 1973:1-2016:4	Banks 1975:2-2016:4
	Real Estate 1990:1-2016:4	Real Estate 1986:1-2016:4	Real Estate 1990:1-2016:4	Real Estate 1973:1-2016:4	Real Estate 1988:3-2016:4
Money Supply	M3 1970:1-2016:4	M3 1970:1-2016:4	M3 1970:1-2016:4	M3 1970:1-2016:4	M3 1970:1-2016:4
Interest Rate	call money rate 1977:1-2016:4	interbank overnight money 1971:1-2016:4	money market rate 1977:1-2016:4	3-month interbank rate 1972:1-2016:4	money market rate 1977:1-2016:4
Inflation	CPI 2000=100 1970:1-2016:4	CPI 2000=100 1970:1-2016:4	CPI 2000=100 1970:1-2016:4	CPI 2000=100 1970:1-2016:4	CPI 2000=100 1970:1-2016:4
Exchange rate	Rupiah/USD 1970:1-2016:4	Ringgit/ USD 1970:1-2016:4	Peso/ USD 1970:1-2016:4	$S/ USD 1970:1-2016:4	Baht/ USD 1970:1-2016:4

4.5 Conceptual Framework and Hypothesis of the Study

To examine the influence of stock market on growth, as well as to study the effect of the Asian and global financial crisis, the following model is used:

$$Y_t = F(SM_t, M_t, R_t, P_t, E_t, CRISIS)$$

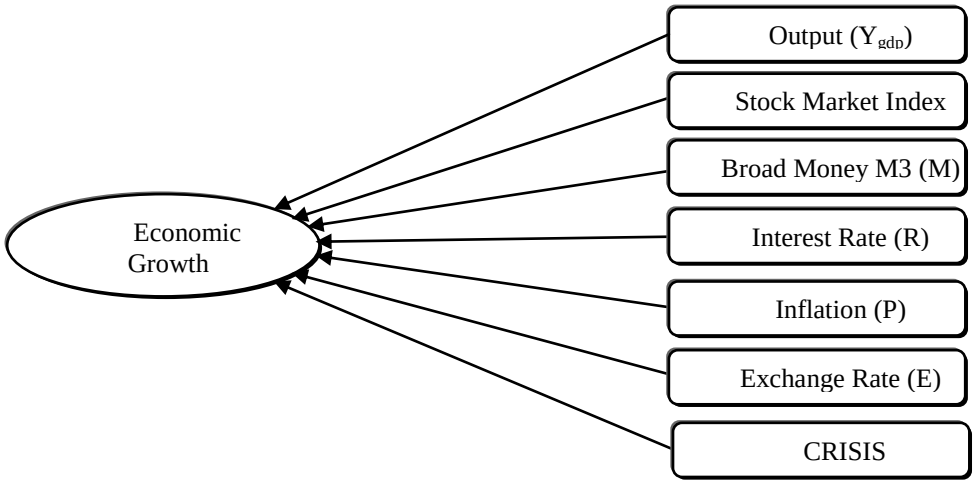
Where the acronyms Y_t, SM_t, M_t, R_t, P_t, E_t, *CRISIS* stand for real gross domestic product/real output (Y), sectoral stock market indices (SM), broad money M3 (M), interest rate (R), inflation (P), exchange rate (E) and dummy crisis. The selection of sectoral stock market indices in this study consist of financial and non-financial index. Index of financial sector comprises of stock prices index and bank index, while the non-financial sector consist of real estate index.

Together with the discussion on specified macroeconomic variables, a comprehensive conceptual framework is designed within the context of ASEAN-5. This framework is expected to contribute to the current literature by fulfilling the purpose of the study on the relationship between stock market and ASEAN-5 economic growth.

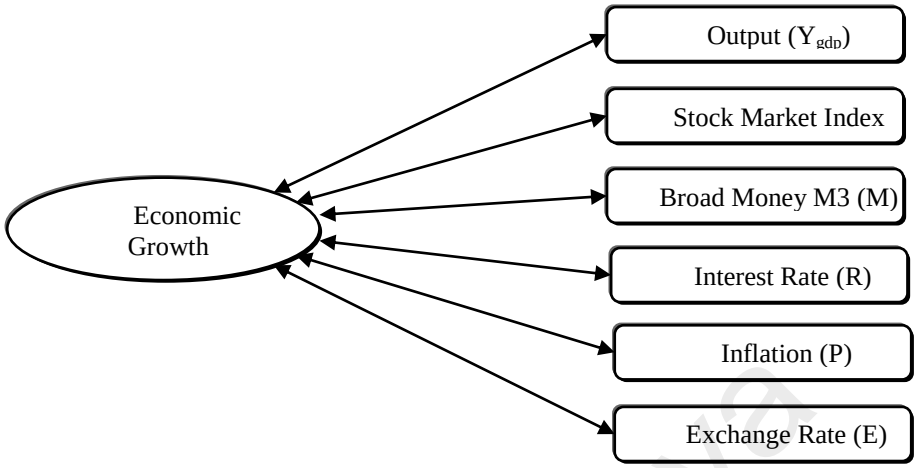
4.5.1 Conceptual Framework

In brief, the conceptual framework can be divided into three main phases to fulfill the aim of this research. They are in sequence depicted as follows:

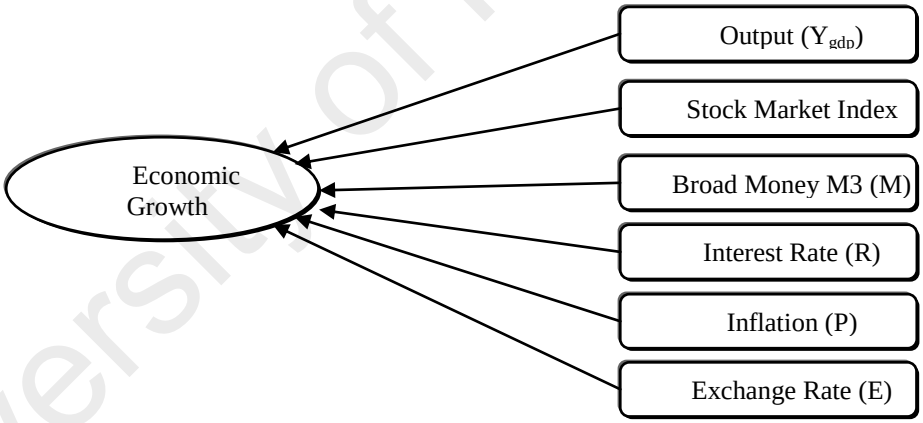
Stage 1: Error Correction Model for Short and Long-run Relationship under the Parsimonious Error Correction Model (PECM)



Stage 2: Granger Causality Analysis for the Direction of the Relationship



Stage 3: Analysis of the Impact of Macroeconomic Variables on Economic Growth under IRF and VDC Framework



4.5.2 Hypotheses of the Study

Following the conceptual framework, a variety of relevant hypotheses are constructed in this study. Concerning the study of parsimonious error correction model and causality linkage between specified variables; the study firstly tests three pairs of following hypotheses for the first and second stage of the conceptual framework. Each pair includes the null hypothesis (H_0) and the alternative hypothesis (H_1) as follows.

Hypothesis 1: **H_0:** All the variables under the study are stationary.

H_1: All the variables under the study are unit processes.

Hypothesis 2 **H_0:** There is no short and long-run relationship between real output and selected variables of SM, M, R, P and E.

H_1: There are short and long-run relationship between real output and selected variables of SM, M, R, P and E.

Hypothesis 3: **H_0:** There is no bidirectional or unidirectional causality between real output and selected variables of SM, M, R, P and E.

H_1: There is bidirectional or unidirectional causality between real output and selected variables of SM, M, R, P and E.

The study secondly tests the two pairs of following hypotheses, in respect of the third phase in conceptual framework.

Hypothesis 4: **H_0:** There is no statistically significant effect of stock market, bank and real estate to shock in real output.

H_1: There is a statistically significant effect of stock market, bank and real estate to shock in real output.

Hypothesis 5: **H_0:** There is no significant effect of shock in the SM, M, R, P and E in explaining the variance in real output.

H_1: There is a significant effect of shock in the SM, M, R, P and E in explaining the variance in real output.

4.6 Econometric Procedure

It is important to note that before estimating the model the data need to be diagnosed so that it have the proper time series properties. This is to ensure that the estimates are reliable and free from spurious regression. The econometric procedures performed on the data are stationarity test and cointegration test. The cointegration test is applied to the non-stationary variables to find out whether they are cointegrated series. If the series are integrated then the VAR model is specified with lagged error-correction term. These tests are essential for the validity of the data and non-spurious estimation of the results. The economic procedures begin with stationarity test and then the cointegration test. The stationarity test in this study consists of Augmented Dickey-Fuller test (ADF), Phillips-Perron test (PP) and Kwiatkowski-Phillips-Schmidt-Shin test (KPSS). These tests are performed based on model with a drift and trend (τ_μ), and, with a drift and without trend (τ_τ). Testing the presence of a unit root is the first step in empirical study before continuing with cointegration test. The cointegration test is an extended work of Johansen (1988) and it provides a likelihood-ratio statistic to test for the maximum number of independent equilibrium vectors in cointegrating matrix. To test for the number cointegrating vectors, Johansen and Juselius provide two likelihood ratio tests statistics. These tests can be defined as trace statistics (λ_{trace}) and max statistics (λ_{max}).

4.6.1 Unit Root Test

A time series is defined as a stationary process if its mean and variance remain unchanged time by time and the value of the covariance between two time periods relies only on the distance between the two time periods and not the actual time at which the covariance is computed (Gujarati, 2011: p. 206).

The phenomenon of spurious regression was originally discussed in Granger and Newbold (1974) and has been widely realized and explained in both theoretical and empirical research (Stock and Watson, 2006; Gujarati, 2003). Suppose there are two non-stationary (random walk) variables, Y_t and X_t processes, with drift parameters (∂ and γ). It suggests that the means and variances of these two series Y_t and X_t must increase over time.

$$Y_t = \partial + Y_{t-1} + \sigma_t \tag{4.12}$$

$$X_t = \gamma + X_{t-1} + \varepsilon_t \tag{4.13}$$

Where σ_t and ε_t are uncorrelated white noise error terms. Each of them is NIID (0,1), implying that they are both normally and independently distributed with zero mean and unit variance (i.e. standard normal distribution).

Consider the following simple regression model:

$$Y_t = \alpha + \beta X_t + \varepsilon_t \tag{4.14}$$

Reasonably, it is expected that the regression output is generating insignificant coefficient $\hat{\beta}$ since the two variables Y and X are unrelated. However, Granger and Newbold (1974) found that this test mostly produces a significant coefficient of $\hat{\beta}$ and a very high explanatory R^2 together with very low DW statistic. Therefore, tests for identifying nonstationary series are essentially required at the early stage of statistical analysis.

The general practice suggests three methods that can be employed to examine the presence of unit roots in time series, namely graphical analysis, correlogram, and unit

root analysis (Gujarati, 2011: p. 208). However, the two former informal analyses possibly generate imprecise conclusions due to a minor difference in performance of a near unit root series compared with a real unit root series.

It is known that there are several formal tests using unit root analysis have been introduced in practice. Concerning a large number of unit root tests, Maddala and Kim (1998, p.45) claims that no test for unit root hypothesis has been found as the uniformly most powerful one. Therefore, the study employs three different unit root techniques, which are most commonly used: Augmented Dickey Fuller (ADF) (Dickey, 1979; 1981)), Phillips-Perron (PP) (Phillips and Perron, 1988), and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) (Kwiatkowski et al., 1992).

While the hypothesis for the ADF and PP tests are the same, in which the null hypothesis claims the presence of a unit root, the KPSS works the other way around, which its null hypothesis claims for stationarity, rather than a unit root in the series. If the ADF and PP both reject the null hypothesis while the KPSS fails to reject the null hypothesis, it could be a sign of the existence of non-stationarity or a unit root in levels.

Statistically, the ADF tests the following equation:

$$\Delta Y_t = \alpha_0 + \beta Y_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta Y_{t-1} + u_t \quad \text{(without time trend)} \quad (4.15)$$

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \beta Y_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta Y_{t-1} + u_t \quad \text{(with time trend)} \quad (4.16)$$

The null hypothesis is H_0: $\gamma = 0$, against the alternative hypothesis where is H_1: $\gamma \neq 0$. The major critical problem of the ADF test refers to the difficulty selecting the appropriate lag length *p*. If *p* is too small, the test can get bias result because of the remaining serial correlation in the errors. Otherwise, if *p* is too large, the power of the test will be affected. Together with some suggestions in the literature to mitigate this issue (i.e. see Ng and Perron, 1995), the statistical software Eviews 9.0 fortunately allows lag length to be selected automatically regarding Akaike Information Criteria

(AIC) and Schwarz Information Criteria (SIC), with a maximum lag length set equal to 9.

To differentiate from ADF test when additional lags of the first differenced variable are used, the PP test uses Newey-West (1987) heteroskedasticity and an autocorrelation-consistent covariance matrix estimator to account for serial correlation. The PP test takes advantages of the ADF test by performing heteroskedasticity in the error term, and does not require a lag length specification in the regression. The PP equation can be formulated as:

$$Y_t = \alpha_0 + \beta Y_{t-1} + u_t \quad \text{(without time trend)} \quad (4.17)$$

$$Y_t = \alpha_0 + \alpha_1 t + \beta Y_{t-1} + u_t \quad \text{(with time trend)} \quad (4.18)$$

Even though the PP test seems powerful than the ADF test regarding lag length specification, it remains subject to severe issues of "bandwidth" parameter selection as part of the Newey-West estimator. However, this can be resolved with the Eviews software, as it allows the bandwidth to be selected automatically using the kernel function Bartlett.

To strengthen the conclusion of unit roots in time series, the study further utilizes the KPSS test following the regression:

$$Y_t = \alpha_0 + \delta \sum_{i=1}^{t} \gamma_i + u_t \quad \text{(without time trend)} \quad (4.19)$$

$$Y_t = \alpha_0 + \alpha_1 t + \delta \sum_{i=1}^{p} \gamma_i + u_t \quad \text{(with time trend)} \quad (4.20)$$

It assumes that u_t is stationary and independently distributed. γ_i has an expected value of zero and variance equals 1. The null hypothesis is that H0: $\delta = 0$ (the process is stationary, or integrated) and the alternative is that H1: $\delta \neq 0$ (the process is nonstationary, or trend-stationary).

In case a series is found as non-stationary, it must be differenced to become stationary in order to solve the spurious equation issue. The times of differencing the

series to become stationary is referred to as the order of integration, or the number of unit roots. An integration of order *d* can be denoted as *I*(*d*) or *I*~(*d*).

4.6.2 Cointegration Test

In the context of the multivariate regression test, this study adopts the Johansen and Juselius (1990) maximum likelihood method. Generally, the approach is applied to *I*(1) variables. The method is an extended work of Johansen (1988) and it provides a likelihood-ratio statistic to test for the maximum number of independent equilibrium vectors in the cointegrating matrix.

In order to test restrictions on the cointegrating vector, Johansen defines the two matrices α and β, both of dimension $(n.r)$ where r is the rank of π. The properties of α and β can be written in the form of:

$$\pi = \alpha\beta' \tag{4.21}$$

Note that β is the matrix of cointegrating parameters and α is the matrix of weights with which each cointegrating vector enters the n equations of the VAR. In a sense, α can be view as the matrix of the speed of adjustment parameters. Using maximum likelihood estimation, it is possible to: (i) determine the rank of π, (ii) use the r most significant cointegrating vectors to form β', and (iii) select α such that $\pi = \alpha\beta'$.

The Johansen-Juselius procedure derive maximum likelihood estimators of the cointegrating vectors for an autoregressive process with independent Gaussian errors and likelihood ratio test for the number of cointegrating vectors (Johansen, 1988; Johansen and Juselius, 1990). Their procedure has the advantage of taking into account the error structure of the underlying process. It can incorporate both the short-run and long-run dynamics of a system in the economic models. It enables to estimate and test the equilibrium relationship among non-stationary series while abstracting from short-run deviations from equilibrium. Thus, it provides relatively powerful tests when the model is correctly specified.

The number of lags applied in the cointegration tests is based on the information provided by the multivariate generalization of the AIC. To test for the number cointegrating vectors of β', Johansen and Juselius provide two likelihood ratio tests statistics. These tests can be defined as λ_{trace} and λ_{max}:

$$\lambda_{trace} = -T \sum_{i=r+1}^{n} \ln(1 - \hat{\lambda}_i) \tag{4.22}$$

$$\lambda_{max} = -T \ln(1 - \hat{\lambda}_{r+1}) \tag{4.23}$$

Where $\hat{\lambda}_i$ is the estimated value of characteristic roots obtained from the estimated Π matrix, n is the number of characteristic root of Π, and T is the number of observations. The former tests the null hypothesis that there are at most r distinct cointegrating vectors, while the latter tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of $r + 1$ cointegrating vectors. These statistics have nonstandard distributions. Both likelihood ratio test statistics are compared to the critical values tabulated and presented in Johansen and Juselius (1990).

Testing for the absence of a constant in the model requires the estimation of two models, the restricted model (H_o: there is no cointegration between variables; r = 0 and r ≤ 1) and the unrestricted model (H_1: there is co-integration between variables), and use of the test statistic:

$$-T \sum_{i=r+1}^{n} \left[\ln\left(1 - \hat{\lambda}_i^o\right) - \ln\left(1 - \hat{\lambda}_i\right)\right] \qquad \sim \chi^2_{(n-r)} \tag{4.24}$$

Where T is the number of usable observation, n is the number of characteristic roots of Π, r is the number of non-zero characteristic roots in the unrestricted model, and $\hat{\lambda}_i^o$ and $\hat{\lambda}_i$ are the ordered characteristic roots of the restricted and unrestricted model, respectively. Thus, if the test statistic is sufficiently large, it is possible to reject the null hypothesis and conclude that there exists a stable long-run relationship between the economic growth and stock market.

4.6.3 Granger Causality Test

A causality relationship between two variables occurs when one variable causes a change in another variable, or the past values of one variable can help predict the future values of another. The standard causality test is conducted by Granger (1969) to check the existence and direction of causality between non-cointegrated variables. The method is later developed similarly to the test for causality between cointegrated variables. The main idea of Granger is originally performed by bivariate VAR functions as follows.

$$X_t = \alpha_1 + \sum_{i=1}^{p} \beta_{1i} X_{t-i} + \sum_{i=1}^{p} \theta_{1i} Y_{t-i} + \varepsilon_{1t} \quad (4.25)$$

$$Y_t = \alpha_2 + \sum_{i=1}^{p} \beta_{2i} X_{t-i} + \sum_{i=1}^{p} \theta_{2i} Y_{t-i} + \varepsilon_{2t} \quad (4.26)$$

The method is proposed to test the null hypotheses:

$$H_0 = \sum_{i=1}^{m} \gamma_{1i} = 0 \quad (4.27)$$

$$H_0 = \sum_{i=1}^{m} \gamma_{2i} = 0 \quad (4.28)$$

The statistical estimation of the coefficients γ_{1i} and γ_{2i} provides evidence of the existence and direction of causality relationships between variables in the system. There are four suggestions as follows.

i. If the estimated coefficient γ_{1i} is statistically significant, but γ_{2i} is not, then variable *Y* Granger-causes variable *X*. The relation between *Y* and *X* is a unidirectional causality. In other words, *Y* drives *X* towards long run equilibrium.

ii. If coefficient γ_{1i} is not statistically significant, but γ_{2i} is, then variable *X* Granger-causes variable *Y*. It suggests a unidirectional causality from *X* to *Y*.

iii. If both estimated coefficients γ_{1i} and γ_{2i} are significant, then *X* and *Y* are said to have bidirectional causality relationship.

iv. If both γ_{1i} and γ_{2i} are statistically not significant, then it is said that no causality occurs between variable *X* and variable *Y*. In other words, *X* and *Y* are independent. The typical statistical mean for Granger causality is the Wald test.

The null hypotheses are set up as all the coefficients of γ_{1i} and γ_{2i} equal zero. A

Wald test estimates F-statistics by the computation as shown below:

The typical statistical mean for Granger causality is the Wald test. The null hypotheses are set up as all the coefficients of γ_{1i} and γ_{2i} equal zero. A Wald test estimates F-statistics by the computation as shown below:

$$F = \frac{(RSS_R - RSS_{UR})/p}{RSS_{UR}/(n-m)} \tag{4.29}$$

Where *p*, *m*, *n* represents the numbers of restrictions, explanatory variables estimated in the unrestricted model including the intercept, and observations. RSS_R and RSS_{UR} are residual sum of squares (R^2) from restricted and unrestricted models, respectively. The null hypothesis is not accepted if the calculated *F*-value exceeds the critical *F*-value at the selected significance level. Therefore, if *F*-statistics exceeds *F*-critical value it means there is causality amongst variables.

4.6.4 Vector Error Correction Model (VECM)

Generally, vector error correction model (VECM) is derived from a vector autoregression (VAR) model in cointegrated variables framework. In a VAR model, each variable regressed on lagged values of its own and other variables in the system. The method treats all variables as endogenous. It estimates how each variables is related to the lagged values of all variables in the system. There are no restrictions imposed on the variables like the exogeneity of the variables. The method estimates the problems of error term correlated with regressors and reduces the possibility of missing any contemporaneous effect originating from the variables that are not included in the equation. Ordinary least squares estimation gives an efficient estimate of the parameter in each of the equation in the system. The VAR modelling has been used widely in analyzing the stock market and economic growth (Dritsaki & Dritsaki-Bargiota, 2005; Nieuwerburgh et al., 2006; Pradhan et al., 2014a; Tsouma, 2009; Zivengwa et al., 2011). The VAR can be written in matrix from as:

$$\begin{bmatrix} 1 & b_{12} \cdots & b_{1n} \\ b_{21} & 1 \cdots & b_{2n} \\ \vdots & \vdots \cdots & \vdots \\ b_{n1} & b_{n2} \cdots & 1 \end{bmatrix} \begin{bmatrix} y_{1t} \\ y_{2t} \\ \vdots \\ y_{nt} \end{bmatrix} = \begin{bmatrix} b_{10} \\ b_{20} \\ \vdots \\ b_{n0} \end{bmatrix} + \begin{bmatrix} x_{11} & x_{12} \cdots & x_{1n} \\ x_{21} & x_{22} \cdots & x_{2n} \\ \vdots & \vdots \cdots & \vdots \\ x_{n1} & x_{n2} \cdots & x_{nn} \end{bmatrix} \begin{bmatrix} y_{1t-1} \\ y_{2t-1} \\ \vdots \\ y_{nt-1} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \\ \vdots \\ e_{nt} \end{bmatrix} \quad (4.30)$$

Or

$$By_t = \Pi_0 + \Pi_1 y_{t-1} + e_t \quad (4.31)$$

Where y_t is a (n x 1) vector of endogenous variables, y_{t-1} is a (n x 1) vector of a predetermined variables and e_t is a (n x 1) vector of structural disturbance. Square matrix B (n x n) measures the contemporaneous response of endogenous variables; Π_0 (n x 1) measures of the coefficients of constant and Π_1 (n x n) measures the contemporaneous response of endogenous variables to predetermined variables. Multiply by B^{-1} gives VAR in standard form as:

$$y_t = A_0 + A_1 y_{t-1} + u_t \quad (4.32)$$

Where $A_0 = B^{-1}\Pi_0, A_1 = B^{-1}\Pi_1$ and $u_t = B^{-1}e_t$

In a higher-order system, the standard VAR is

$$y_t = A_0 + A_1 y_{t-1} + A_2 y_{t-2} + \ldots + A_n y_{t-p} + u_t \quad (4.33)$$

Or

$$y_t = A_0 + \sum_{i=1}^{p} A_i\, y_{t-1} + u_t \qquad E(u_t u_s) = \Sigma_u \quad \text{if } t \neq s \quad (4.34)$$

Where u_t is serially uncorrelated disturbances with zero mean; $E(u_t) = 0$, and variance-covariance matrix $E(u_t\, u_s) = \Sigma_u$ if $t \neq s$ is symmetric positive semi definite matrix.

The estimates of the constants and the coefficients are obtained by applying ordinary least squares (OLS) to each equation in the system. The estimates of variance/covariance matrix, Σ_u are obtained from the OLS residuals. To avoid identification problem in the model, Choleski decomposition is used to orthogonalise the residuals. That is, it involves specification of a recursive ordering of the variables, so that the matrix of structural coefficients is unique lower triangular. It requires all elements above the main diagonal to be zero.

$b_{12} = b_{13} = b_{14} = \ldots b_{1n} = 0$

$b_{23} = b_{24} = \ldots b_{2n} = 0$

$b_{34} = \ldots b_{3n} = 0$

…

$b_{n\text{-}1n} = 0$

The parameter is restricted such that, the first variable responds to its own exogenous shock with no contemporaneous effect from other variables, the second variable responds to the first variable and its own exogenous shock, the third variable responds to the first variable, second variable and its own shock and so on. The system is exactly identified when impose $(n^2 - n)/2$ restrictions on the structural model where n is the endogenous variables or equations included in system. The variance/covariance matrix of the forecast errors is, Σ_u

$$\sum = \begin{bmatrix} \phi_1^2 & \phi_{12} & \cdots & \phi_{1n} \\ \phi_{12} & \phi_2^2 & \cdots & \phi_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ \phi_{1n1} & \phi_{n2} & \cdots & \phi^{nm} \end{bmatrix}$$

Where $\phi_{ij} = (1/N) \sum_{t=1}^{n} u_{it} u_{jt}$ and N is number of usable observations.

VAR models are useful in assessing the dynamic responses of the economic variables to shocks. Using the variance or covariance matrix, through the impulse response functions, the dynamic responses of the variables in response to shocks are traced out at a different time path. The variance decomposition determines the proportion of the unexpected movements in variables that is attributable to each of the orthogonalized shock. Nevertheless, consistent estimates of the responses are greatly influenced by the ordering of the variables in the system. That is, the variables are ordered according to their causal priority or prior belief in nature of contemporaneous feedback among the variables in the system.

The vector autoregressive process based on Gaussian (normally distributed) errors has been widely used in macroeconomic time-series data. This is due to the VAR model

is flexible, easy to estimate and it usually gives a good fit to macroeconomic data. However, the possibility of combining long-run and short-run information in the data by exploiting the cointegration properties is probably the most important reason why this study uses VAR model.

This study analyzes three different models of stock market, bank and real estate indices, while for each model consists six variables: real output (y), stock market index (sr), broad money M3 (m), interest rate (r), inflation (p) and exchange rate (e). In addition, the study investigates five ASEAN countries: Indonesia, Malaysia, Philippines, Singapore and Thailand. Therefore, under the maximum likelihood approach of Johansen (1988), the VAR model can be reparameterized as:

$$\Delta y_t = \mathrm{b}_0 + \mathrm{b}_1 \Delta y_{t-1} + \mathrm{b}_2 \Delta y_{t-2} + \ldots + \mathrm{b}_{p-1} \Delta y_{t-p+1} + \Pi y_{t-p} + e_t \qquad (4.35)$$

Where $y_t = \{, sr, m, r, p, e\}$ is a 6x1 vector of the first-order integrated, for instance, all the series integrated at the same order of $I(1)$. The variables considered in this studies are real output (y), stock market index (sr), broad money M3 (m), interest rate (r), inflation (p) and exchange rate (e). Whereas, b_1 is 6x6 coefficient matrices, and e_t is normally and independently distributed error terms. The existence of cointegrating vectors (r) implies Π is rank-deficient. The maximal eigenvalue (λ_{max}) and trace (λ_{trace}) statistic tests derived by Johansen (1988) is used to identify the number of cointegrating vectors in the VAR model. Appropriate critical values are tabulated in Osterwald-Lenum (1992). If Π is of rank $r(0 < r < 6)$, then it can be decomposed as: $\Pi = \alpha\beta'$, where $\alpha_{(6\mathrm{x}r)}$ and $\beta_{(6\mathrm{x}r)}$.

Thus, under the $I(1)$ hypothesis, the cointegrated VAR model (derive from equation 4.34) is written as:

$$\Delta y_t = \Gamma_0 + \Gamma_1 \Delta y_{t-1} + \Gamma_2 \Delta y_{t-2} + \ldots + \Gamma_{p-1} \Delta y_{t-p+1} + \alpha(\beta' y_{t-1}) + e_t \qquad (4.36)$$

Where α is the error correction coefficients, which indicate the speed of adjustment towards long-run equilibrium; $\beta' y_{t-1}$ is an r x 1 vector of stationary cointegration

relations. Under the hypothesis that $x_t \sim I(1)$, all stochastic components are stationary in model above (equation 4.36) and the system is logically consistent.

Based on Granger's theorem (1983), Engle and Granger (1987) point out that if a number of variables are cointegrated, there always exists a corresponding error correction representation. That is, changes in the dependent variables depend on the level of disequilibrium in the cointegrating relationship and changes in the other explanatory variables. The model combines the short-run dynamics as well as the long-run equilibrium adjustments of the analyzed variables. The VECM is derived by reparameterization VAR from equation (4.34) as follows:

$$\Delta y_t = A_0 + (A_1 - 1)\Delta y_{t-1} + (A_2 + A_1 - 1)y_{t-2} + \cdots + (A_{p-1} + \cdots + A_2 + A_1 - 1)$$

$$\Delta y_{t-p+1} + (A_p + A_{p-1} + \cdots + A_2 + A_1 - 1)y_{t-p} + u_t \quad (4.37)$$

Or,

$$\Delta y_t = \mathrm{A}_0 + \Gamma_1 \Delta y_{t-1} + \Gamma_2 \Delta y_{t-2} + \ldots + \Gamma_{p-1} \Delta y_{t-p+1} + \Gamma y_{t-p} + u_t$$

$$\Delta y_t = A_0 + \sum_{i=1}^{p} \Gamma_i \, \Delta y_{t-i} + \Gamma y_{t-p} + u_t \quad (4.38)$$

where $\Gamma = -\left[I - \sum_{i=1}^{p} A_i\right]$ and $\Gamma_i = -\left[I - \sum_{j=1}^{p-1} A_j\right]$

An error correction mechanism is measured by Γy_{t-p} or $e_{it} = \Gamma y_{t-p}$, a deviation from long-run equilibrium. Matrix Γ provides information on the long-run relationship among the variables. It measures the speed of adjustment of coefficient vector (n x r). The rank of matrix Γ, is the number of cointegrating vectors (r). For 1 < r < n, there are multiple cointegrating vectors. Γy_{t-p} is a linear combination of non-stationary variables integrated of order (*d-b*). Matrix Γ_i represents the short-run dynamics.

To examine the multivariate relationship among the variables, this study uses the VECM framework. The VECM regresses the change in both dependent and independent variables on lagged deviations. Having obtained the long-run cointegration relations using the Johansen approach, it is possible to formulate the model in equation (4.36) and

estimate the vector error correction model (VECM) with the error correction terms. The multivariate relationship test based on VECM can be formulated as follows:

$$\Delta y_t = \Gamma_0 + \Gamma_1 \Delta y_{t\text{-}1} + \Gamma_2 \Delta y_{t\text{-}2} + \ldots + \Gamma_p \Delta y_{t\text{-}p} + \alpha(\beta_1' y_{t\text{-}1} + \beta_2' y_{t\text{-}2}) + \varphi D_{qt} + e_t \quad (4.39)$$

Where D_{qt} is the zero/one vector of dummies corresponding to quarter q and y_t enters the error correction term with a lag of $t-1$ or $t-k$. At this stage, no separate restrictions are placed on α. Thus, ordinary least squares (OLS) is an efficient way to estimate equation (4.39), given that each has a common set of (lagged) regressors. Since all the variables in the model are now $I(1)$, statistical inference using standard *t*-tests and *F*-tests is valid.

Estimating the multivariate system denoted by equation (4.39) confirms the tests of weak exogeneity and whether all the common lagged ΔX_{t-p} are significant in every equation. Thus, parsimony can be achieved by removing the insignificant regressors and testing whether this reduction in the model supported by an *F*-test. For parsimony, the parameter estimates are derived by dropping some of the insignificant variables from the estimated model and retaining only the desirable variables. This model is called as parsimonious error correction model (PECM). In addition, dropping all non-significant lagged terms resulted in acceptance of the null hypothesis that the omitted regressors have zero coefficients. Finally, the resultant model is checked in terms of diagnostic tests on the residuals together with parameter constancy involving the recursive properties of the model, such as the residuals test and Chow F-test. The parsimonious reduced-form system is generally congruent as defined by the Hendry general-to-specific approach to modeling[13].

[13] Campos, J., Ericsson, N. R., & Hendry, D. F. (2005). General-to-specific modeling: An overview and selected bibliography. Board of Governors of the Federal Reserve System, *International Finance Discussion Papers*.

4.6.5 Impulse Response Function (IRF)

The impulse response function is used to trace the time path of structural shocks in the VAR system. One of the common methods used to examine the time path of the shock is the Sims (1980) framework of cholesky decomposition. This approach however has been criticized for the reason that it is quite sensitive to the order of the variables in the system. This is because it is not unique because errors in the system are orthogonal with one another, indicating that they are contemporaneously uncorrelated with standard errors. To solve this problem, this study uses the general impulse response function (GIRF) from Pesaran and Shin (1998). This method is invariant to the ordering of the variables in the VAR system. The approach is unique because it shows that the structural errors are correlated and therefore a unit shock to one error affects other errors in the system.

Sims's (1980) VAR approach has the desirable property that all variables are treated symmetrically. A VAR model can be used in examining the relationship among a set of economic variables. Moreover, the model also can be used for forecasting purposes.

In the two variable case, the time path of $\{y_t\}$ affected by current and past realizations of the $\{z_t\}$ sequence and let the time path of the $\{z_t\}$ sequence be affected by current and past realizations of the $\{y_t\}$ sequence. Consider the simple bivariate equation as follows:

$$y_t = b_{10} - b_{12}z_t + \gamma_{11}y_{t-1} + \gamma_{12}z_{t-1} + \varepsilon_{yt} \tag{4.40}$$

$$z_t = b_{20} - b_{21}y_t + \gamma_{21}y_{t-1} + \gamma_{22}z_{t-1} + \varepsilon_{zt} \tag{4.41}$$

Where it is assumed that (i) both y_t and z_t are stationary; (ii) ε_{yt} and ε_{zt} are white-noise disturbances with standard deviations of σ_y and σ_z, respectively; and (iii) $\{\varepsilon_{yt}\}$ and $\{\varepsilon_{zt}\}$ are uncorrelated white-noise disturbances.

Equations (4.40) and (4.41) constitute a first-order vector autoregression (VAR) because the longest lag length is unity. The simple two variable first-order VAR is

useful for illustrating the multivariate higher order systems. The structure of the system incorporates feedback because y_t and z_t is allowed to affect each other. For example, -b_{12} is the contemporaneous effect of a unit change of z_t on y_t, and γ_{12} is the effect of a unit change in z_t on y_t. Note that the terms of ε_{yt} and ε_{zt} are pure innovations (or shocks) in y_t and z_t respectively. Hence, if -b_{21} is not equal to zero (-$b_{21} \neq 0$), ε_{yt} has an indirect contemporaneous effect on z_t, and if -$b_{12} \neq 0$, ε_{zt} has an indirect contemporaneous effect on y_t.

Equations (4.40) and (4.41) are not reduced-form equations since y_t has a contemporaneous effect on z_t and vice versa. It is possible to transform the system of equations into a more usable form. Using matrix, the equations can be written as:

$$\begin{bmatrix} 1 & b_{12} \\ b_{21} & 1 \end{bmatrix} \begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} b_{10} \\ b_{20} \end{bmatrix} + \begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{bmatrix} \begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix}$$

Or

$$Bx_t = \Gamma_0 + \Gamma_1 x_{t-1} + \varepsilon_t$$

Where:

$$B = \begin{bmatrix} 1 & b_{12} \\ b_{21} & 1 \end{bmatrix};\ x_t = \begin{bmatrix} y_t \\ z_t \end{bmatrix};\ \Gamma_0 = \begin{bmatrix} b_{10} \\ b_{20} \end{bmatrix};\ \Gamma_1 = \begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{bmatrix};\ \varepsilon_t = \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix}$$

Premultiplication by B^{-1} allows obtaining the VAR model in standard form as follows:

$$x_t = A_0 + A_1 x_{t-1} + e_t \tag{4.42}$$

Where: $A_0 = B^{-1}\Gamma_0$; $A_1 = B^{-1}\Gamma_1$; $e_t = B^{-1}\varepsilon_t$

Using the new notation, equation (4.42) can be written in the following form:

$$y_t = a_{10} + a_{11} y_{t-1} + a_{12} z_{t-1} + e_{1t} \tag{4.43}$$

$$z_t = a_{20} + a_{21} y_{t-1} + a_{22} z_{t-1} + e_{2t} \tag{4.44}$$

To distinguish between the equations represented by (4.40) and (4.41) versus (4.43) and (4.44), the first two equations is called a structural VAR or the primitive equation, whereas, the equations (4.43) and (4.44) is called a VAR in standard form. It is

important to note that the error terms of e_{1t} and e_{2t} are composites of the two shocks ε_{yt} and ε_{zt}. Since $e_t = B^{-1}\varepsilon_t$, thus it can compute e_{1t} and e_{2t} as:

$$e_{1t} = (\varepsilon_{yt} - b_{12}\varepsilon_{zt})/(1 - b_{12}b_{21}) \quad (4.45)$$

$$e_{2t} = (\varepsilon_{zt} - b_{21}\varepsilon_{yt})/(1 - b_{12}b_{21}) \quad (4.46)$$

Or simplify the model (4.34) and (4.35) as:

$$\begin{bmatrix} e_{1t} \\ e_{2t} \end{bmatrix} = \frac{1}{1 - b_{12}b_{21}} \begin{pmatrix} 1 & -b_{12} \\ -b_{21} & 1 \end{pmatrix} \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix}$$

Given the economic model of (4.33) and (4.34), ε_{yt} and ε_{zt} are the autonomous changes in y_t and z_t in period t, respectively. Thus, in order to obtain the impulse response functions or the variance decompositions, it is necessary to use the structural shocks of ε_{yt} and ε_{zt}.

In general, the shocks will be uncorrelated if $b_{12} = b_{21} = 0$ or in the other words, there are no contemporaneous effects of y_t on z_t and vice versa. It is useful to define the variance/covariance matrix of the ε_{yt} and ε_{zt} shocks as:

$$\Sigma = \begin{bmatrix} var(\varepsilon_{1t}) & cov(\varepsilon_{1t}, \varepsilon_{2t}) \\ cov(\varepsilon_{1t}, \varepsilon_{2t}) & var(\varepsilon_{2t}) \end{bmatrix}$$

Since all the elements of Σ are time-dependent, the more compact form can be represented as follows:

$$\Sigma = \begin{bmatrix} \sigma_1^2 & \sigma_{12} \\ \sigma_{21} & \sigma_2^2 \end{bmatrix}$$

Where $var(\varepsilon_{it}) = \sigma_i^2$ and $cov(\varepsilon_{1t}, \varepsilon_{2t}) = \sigma_{12} = \sigma_{21}$.

4.6.6 Variance Decompositions (VDC)

The variance decomposition, also known as innovation accounting, measures the importance of each shock in the independent variable in explaining the variance in dependent variable at different step-ahead forecasts. To examine dynamic interactions among the variables in the VAR system, this study used the variance decompositions (VDC) analysis. It measures the percentage of the forecast error of variable that is

explained by another variable. Also, it shows the relative effect of one variable with another variable. At the same time, it provides information on how a variable of interest responds to shocks or innovations in other variables. Understanding the properties of the forecast errors is helpful in uncovering interrelationships among variables in the system. Thus, in the context of this study, it allows us to explore the relative importance of stock market in accounting for variations in economic growth. To interpret economic implications from VDC findings, the Sim's (1980) innovation accounting procedure is employed. This procedure involves the decomposition of forecast error variance of each variable into components attributable to its own innovations and to shocks of other variables in the system.

Assume that the coefficient A_0 and A_1 are known, and we want to forecast the various values of x_{t+i} conditional on the observed value of x_t. Updating equation (4.42) one period and taking the conditional expectation of x_{t+1}, we obtain:

$$E_t x_{t+1} = A_0 + A_1 x_t$$

Note that, the one-step-ahead forecast error is $x_{t+1} - E_t x_{t+1} = e_{t+1}$. Similarly, updating two periods, we get:

$$\begin{aligned} x_{t+2} &= A_0 + A_1 x_{t+1} + e_{t+2} \\ &= A_0 + A_1(A_0 + A_1 x_t + e_{t+1}) + e_{t+1} \end{aligned}$$

Taking the conditional expectations, the two-step-ahead forecast of x_{t+2} is:

$$E_t x_{t+2} = (I + A_1)A_0 + A_1^2 x_t$$

The two-step-ahead forecast error is $e_{t+2} + A_1 e_{t+1}$. To obtain n-step-ahead forecast, the equation can be written as:

$$E_t x_{t+n} = (I + A_1 + A_1^2 + \ldots + A_1^{n-1})A_0 + A_1^n x_t$$

Thus, the associated forecast error is:

$$e_{t+n} + A_1 e_{t+n-1} + A_1^2 e_{t+n-2} + \ldots + A_1^{n-1} e_{t+1} \qquad (4.47)$$

If we use $x_t = \mu + \sum_{i=0}^{\infty} \emptyset_i \varepsilon_{t-i}$ to conditionally forecast x_{t+1}, the one-step-ahead the forecast error is $\emptyset_0 \varepsilon_{t+1}$. In general,

$$x_{t+n} = \mu + \sum_{i=0}^{\infty} \emptyset_i \varepsilon_{t+n-i}$$

So that the *n*-period forecast error $x_{t+n} - E_t x_{t+n}$ is:

$$x_{t+n} - E_t x_{t+n} = \mu + \sum_{i=0}^{n-1} \emptyset_i \varepsilon_{t+n-i}$$

By focusing on the $\{y_t\}$ sequence, the *n*-step-ahead forecast error is:

$$y_{t+n} - E_t y_{t+n} = \emptyset_{11}(0)\varepsilon_{yt+n} + \emptyset_{11}(1)\varepsilon_{yt+n-1} + \ldots + \emptyset_{11}(n\text{-}1)\varepsilon_{yt+1} + \emptyset_{12}(0)\varepsilon_{zt+n} + \emptyset_{12}(1)\varepsilon_{zt+n-1} + \ldots + \emptyset_{12}(n\text{-}1)\varepsilon_{zt+1}$$

Denote the *n*-step-ahead forecast error variance of y_{t+n} as $\sigma_y(n)^2$:

$$\sigma_y(n)^2 = \sigma_y^2[\emptyset_{11}(0)^2 + \emptyset_{11}(1)^2 + \ldots + \emptyset_{11}(n\text{-}1)^2] + \sigma_z^2[\emptyset_{12}(0)^2 + \emptyset_{12}(1)^2 + \ldots + \emptyset_{12}(n\text{-}1)^2]$$

Because all the values of $\emptyset_{jk}^{(i)^2}$ are necessarily nonnegative, the variance of the forecast error increases as the forecast horizon n increases. It is possible to decompose the *n*-step-ahead forecast error variance into the proportions due to each shock. Respectively, the proportions of $\sigma_y(n)^2$ due to shocks in the $\{\varepsilon_{yt}\}$ and $\{\varepsilon_{zt}\}$ sequences are:

$$\frac{\sigma_y^2[\emptyset_{11}(0)^2 + \emptyset_{11}(1)^2 + \ldots + \emptyset_{11}(n\text{-}1)^2}{\sigma_y(n)^2}$$

and

$$\frac{\sigma_z^2[\emptyset_{12}(0)^2 + \emptyset_{12}(1)^2 + \ldots + \emptyset_{12}(n\text{-}1)^2}{\sigma_y(n)^2}$$

The forecast error variance decomposition shows that the proportion of the movements in a sequence is due to it's "own' shocks versus shocks to the other variable. If ε_{zt} shocks explain none of the forecast error variance of $\{y_t\}$ at all forecast horizons,

we can say that the $\{y_t\}$ sequence is exogenous. In this circumstance, $\{y_t\}$ evolves independently of the ε_{zt} shocks and of the $\{z_t\}$ sequence. At the other extreme, ε_{zt} shocks could explain all of the forecast error variance in the $\{y_t\}$ sequence at all forecast horizons, so that $\{y_t\}$ would be entirely endogenous.

It is important to note that the variance decomposition contains the same problem inherent in impulse response analysis. In order to identify the $\{\varepsilon_{yt}\}$ and $\{\varepsilon_{zt}\}$ sequences, it is necessary to restrict the B matrix. In practice, it is useful to examine the variance decompositions at various forecast horizons. As n increases, the variance decompositions should converge. Moreover, if the correlation coefficient is significantly different from zero, it is customary to obtain the variance decompositions under various orderings. Nevertheless, impulse response analysis and variance decompositions or known as "innovation accounting", can be a useful tool to examine the relationships amongst variables.

4.7 Diagnostic Test

Diagnostic tests are important tools for the time series modeling. Diagnostic test concerns the evaluation of the estimation results. In time-series analysis, it is usual to estimate the presence of autocorrelation. Misspecification error will occur if residual autocorrelation is present. Also, the phenomenon of heteroskedasticity in the disturbances occurs mainly in model. When heteroskedasticity occurs in the model it is possibly caused by a relationship between the disturbance variance and one or more variables. However, heteroskedasticity can also be caused by the data. Therefore, the normality test and parameter stability also will be used in this study in order to determine the goodness of fit of a time-series model.

4.7.1 Autocorrelation Test

Autocorrelation can occur in model for time-series data. There are two exceptions exists where systematic behavior arises in the disturbance term. One reason is the explicit specification of autocorrelation, as happens in the SUR model. A SUR model is a multiple equation model with seemingly unrelated regression equations. A second reason that autocorrelated disturbance can arises is by transformation of the original model, which can result in a moving-average or MA(1) disturbance term. An example of an MA(1) disturbance term is, a model where expectations variable has been eliminated or a distributed lag specification for an explanatory variable has been eliminated. An MA(1) disturbance term (υ_t) is written as:

$$\upsilon_t = \mu_t - \lambda\mu_{t-1}$$

with $\upsilon_t \sim NID(0, \sigma_\mu^2)$,

Where υ_t is the disturbance term of the original model. Thus, it is not necessary to test for the absence of autocorrelation if υ_t is autocorrelated.

When the model is specified with different assumption, the disturbance is written as:

$$y = X\beta + \mu$$

$$u \sim N(0, \Omega)$$

In case the autocorrelation exists because of a specific model specification, like the SUR model, or because of model transformations. It is a correct procedure to determine the covariance matrix Ω of the disturbances and use general least squares (GLS) for getting efficient estimates of the parameters.

4.7.2 Heteroskedasticity Test

Although heteroskedasticity can be an indication for specification errors, it is quite possible that heteroskedasticity occurs in the model. When heteroskedasticity occurs in the model it is possibly caused by a relationship between the disturbance variance and one or more variables. Therefore, heteroskedastic disturbances can also be found in models for time-series data. In order to tackle the problem of specification errors, it is considered to tests for the White test (White, 1980), the Breusch-Pagan test (Breusch and Pagan, 1979) and the trends in $\sigma^2_{\mu i}$.

4.7.3 Normality Test

A standard normality test is the Jarque-Bera (JB) test. The JB test statistic can be used for the models with a constant term. It can define in the statistical as follows:

$$JB = \eta\left(\frac{S^2}{6} + \frac{(K-3)^2}{24}\right)$$

Where *S* and *K* measure of skewness and kurtosis. The JB-statistic is expressed in terms of the third and fourth moments of the disturbances:

$$S = \frac{\mu_3}{\sigma^3} = \frac{\mu_3}{(\mu_2)^{3/2}}$$

$$K = \frac{\mu_4}{\sigma^4} = \frac{\mu_4}{(\mu_2^2)}$$

The moments can be estimated from the OLS residuals:

$$\hat{\mu}_i = \frac{1}{n}\sum_{t=1}^{n} e_t^i, \quad \text{with } i=2,3,4$$

It is known that the third moment of a symmetric distribution is zero, so for a normally distributed variable is $\mu_3 = 0$. This implies that the values for *K* and *S* when the variable is standard normally distributed are, *K*=3 and *S*=0.

4.7.4 Parameter Stability

The stability of the parameter estimates in the sample period can be obtained by computing recursive coefficients estimates and looking at the plots. The idea behind recursively estimating the parameters of the equation is repeatedly adding one observation and subsequently re-estimating the parameters. However, the CUSUM test and CUSUM of squares test can be considered to check for the model stability. The CUSUM statistic is based on cumulative sums of scaled recursive residuals and is plotted against time. The expectations of the CUSUM statistics are zero under the null hypothesis of constant parameters. When the graph of the CUSUM statistics revolves around zero within its confidence bounds, the null hypothesis of parameter constancy is not rejected. This implies that the parameter is stable.

4.8 Summary

To summarize, this chapter selects and defines all of the variables under investigation. It further designs a comprehensive conceptual framework as well as a methodological strategy to fulfill the objectives of the research that are proposed in Chapter 1. In particular, the interrelations between ASEAN stock market and five selected macroeconomic variables are examined under three sound frameworks in applied financial econometrics that comprised of vector error correction models (VECM), Granger causality test, vector error correction model (VECM) and dynamic analysis (impulse response function and variance decomposition).

More specifically, the study used quarterly data covering the period 1990Q1 to 2016Q4 for Indonesia, Malaysia, Philippines, Singapore and Thailand. The data are gathered from the official websites of Department of Statistics Indonesia, Department of Statistics Malaysia, National Statistical Coordination Board of Philippines, Department of Statistics Singapore and Office of the National Economic and Social Development Board, Thailand. The cointegration analysis under VAR framework is initially operated to detect the long-term equilibrium and short-run dynamics between economic variables (economic growth – Y, inflation rate – P, money supply – M, interest rates – R, exchange rate – E) and stock market in ASEAN-5. Afterwards, long- and short-run relationship among variables is determined by vector error correction model (VECM).

This study further examines variance decomposition (VDC) and the impulse response function (IRF). Variance decomposition or forecast error-variance examines the percentage of innovation each variable contributes to other variables in the VAR system. This allows us to know which of the relative endogenous or exogenous to the system by simply decomposing the proportion variance due to its own shock and shock of other variables in the system. For example, if the shocks of other independent variables in the system explain less of the forecast error-variance of the dependent

variable, it means that dependent variable is exogenous to the system. However, if it turns out that most of the shocks of the independent variables explain the forecast error-variance of the dependent variable, it means that it is endogenous to the system.

The next chapter will describe statistical results, and then analyze all of the empirical findings that were achieved from econometric techniques studied.

CHAPTER 5: EMPIRICAL FINDINGS

5.1 Introduction

The empirical findings and analysis of the study begins with the stationary test of a unit root. This test is carried out based on Augmented Dickey Fuller (ADF) test, Phillips-Perron (PP) test and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test. Testing the presence of a unit root is the first step in empirical study before continues with cointegration test. Then, the analysis proceeds with Johansen cointegration test to identify the presence of the cointegrating vectors. Identifying the cointegration relationship using the Johansen and Juselius (JJ) approach provides valuable information regarding the dynamic interactions among vectors. After estimating the cointegration relations for all models, the study extends with the parsimonious error correction model (PECM) to identify the significant role of the stock market on growth in the short-run as well as in the long-run. The robustness of the model is evaluated through the diagnostic test. The selection of lag length is based on the model that provides satisfactorily diagnostic statistics. For an example: no serial correlation, data is normal distribution, the absence of heteroscedasticity and no specification error in the model. Granger's causality test is further applied in this study to analyze whether there is any unidirectional or bidirectional causal relations among the variables specified. According to Engle and Granger (1987), once a set of variables is I (1) and a cointegration has been established, there will be a causal relationship between two cointegrated non-stationary series, in at least one direction. Therefore, the study carried out a standard pairwise Granger causality test to to investigate the presence of any bivariate causality among variables. To trace temporal responses and measures the percentage of the forecast error of variable that is explained by another variable, the impulse response functions (IRFs) and variance decompositions analysis (VDC) is used

in this study. The differences between these two analyses are, the IRF trace the effects of a shock to one endogenous variable on to the other variables in VAR, whereas, VDC separates the variation in an endogenous variable into the component shocks to the VAR. The IRF and forecast error VDC are obtained from the unrestricted VAR form of the model. The IRF and VDC analyses are sensitive to the lag length used and the ordering of the variables. The lag length in this analysis is selected using the lag structure through Akaike information criterion (AIC) and Schwarz Bayesian criterion (SBC). Both SBC and AIC introducing a penalty term for the number of parameters in the model to overcome the problem of random error, this penalty term is larger in SBC than in AIC. The estimation reported in this finding is carried out using statistical software Microfit 5.0 (Pesaran and Pesaran, 1997) and Eviews 9.0 (Quantitative Micro Software, 2015).

5.2 Unit Root Tests

The ADF, PP and KPSS test statistics are performed based on the model with intercept (τ_μ), and, with trend and intercept (τ_τ). Table 5.1 reports the ADF test, PP test and KPSS test for the log levels and first differences. Unit root tests are performed on the Jakarta stock exchange (jkse), Kuala Lumpur stock exchange (klse), Philippines stock market composite index (psei), Singapore stock exchange (sti), Bangkok stock exchange (set), stock market indices (banks and real estate), economic growth (Y_{gdp}), broad money M3 (m), the interest rate (r), inflation (p), and the exchange rate (e). The occurrence of a unit root is determined by comparing computed t-statistics and critical values provided in Table 5.1 (notes in Table 5.1). Regarding the ADF and PP tests, the null hypothesis of a unit root cannot be accepted unless the computed t-statistic excesses the critical value at 5 percent level of significance. In contrast, the null hypothesis of the KPSS test is rejected if the computed t-statistic surpluses the critical value at the significance level of 5 percent.

The unit root tests results shows that the ADF test are not sufficiently large to reject the null hypothesis of unit root in the level series with intercept (τ_μ), and, with trend and intercept (τ_τ). This suggests that the level data for Indonesia, Malaysia, Philippines, Singapore and Thailand contains a unit root. Meanwhile, the presence of unit root is rejected for all variables when first difference data are used, hence this suggests the series are stationary after differencing one I(1). Under the PP test, the rejections of null hypothesis of a unit root are failed for a majority of all variables at levels form, but statistically reject the null hypothesis in the first differences. It implies that all the variables are first difference stationary time series, not stationary at levels. In other words, these variables are individually integrated at I(1). Interestingly, the KPSS test show the matches in results compared to two previous tests (ADF and PP). All variables of interest are found as I(1), while they contain unit roots at level then become

stationary after the first differenced either when they contain intercept (τ_μ) or both trend and intercept (τ_τ). The findings from the unit root tests show that the same order of integration among the selected variables is sufficient to apply the cointegration test of Johansen techniques.

Table 5.1: Unit Root Tests for ASEAN-5

	Augmented Dickey Fuller (ADF) H_0: Unit Root			Phillips Perron (PP) H_0: Unit Root			Kwiatkowski-Phillips-Schmidt-Shin (KPSS) H_0: Mean Stationary		
Series	Level		Difference	Level		Difference	Level		Difference
	Tμ	Tτ	Tμ	Tμ	Tτ	Tμ	Tμ	Tτ	Tμ
Indonesia									
Y_{gdp}	-1.52[4]	-0.72[4]	-4.02[4]^a	-1.74[4]	-0.47[4]	-11.68[4]^a	2.22[4]^a	0.37[4]^a	0.33[9]
jkse	-0.10[4]	-2.19[4]	-5.34[4]^a	-0.07[4]	-2.98[4]	-9.64[4]^a	1.80[4]^a	0.38[4]^a	0.24[4]
bnk	-1.54[4]	-1.55[4]	-4.59[4]^a	-1.63[4]	-1.70[4]	-9.89[4]^a	0.71[2]^b	0.36[4]^a	0.14[4]
res	-0.85[4]	-1.63[4]	-5.90[4]^a	-1.18[4]	-2.03[4]	-10.29[4]^a	1.01[3]^b	0.43[4]^a	0.15[4]
m	-1.99[4]	-1.60[4]	-3.47[4]^b	-2.44[4]	-1.29[1]	-10.61[4]^a	2.18[4]^a	0.43[4]^a	0.33[1]
r	-2.38[4]	-2.77[2]	-4.90[4]^a	-2.05[4]	-2.95[4]	-8.81[4]^a	1.19[4]^a	0.21[2]^b	0.04[4]
p	-1.57[4]	-1.05[4]	-4.64[4]^a	-1.57[4]	-0.99[4]	-5.16[4]^a	2.17[4]^a	0.45[4]^a	0.27[4]
e	-1.48 [4]	-1.59[4]	-4.57[4]^a	-1.51[4]	-1.89[4]	-7.59[4]^a	1.71[4]^a	0.37[4]^a	0.10[4]
Malaysia									
Y_{gdp}	-1.92[4]	-2.18[4]	-6.18[4]^a	-2.03[4]	-2.14[4]	-8.92[4]^a	2.23[4]^a	0.34[4]^a	0.30[4]
klse	-1.72[4]	-2.82[4]	-4.84[4]^a	-1.72[4]	-2.91[4]	-11.53[4]^a	1.50[4]^a	0.22[4]^a	0.03[4]
bnk	-1.89[4]	-3.03[6]	-4.61[4]^a	-1.72[4]	-2.87[1]	-10.57[4]^a	1.90[4]^a	0.17[1]^b	0.05[4]
res	-2.41[1]	-3.03[6]	-5.44[4]^a	-2.57[8]	0.19[4]	-11.69[4]^a	1.09[3]^b	0.23[1]^a	0.02[4]
m	-2.39[4]	-1.90[4]	-5.17[1]^a	-1.81[5]	-1.81[4]	-6.64[4]^a	2.19[4]^a	0.35[4]^a	0.11[4]
r	-2.30[4]	-2.81[1]	-5.00[4]^a	-1.85[4]	-2.81[4]	-7.32[4]^a	1.32[4]^a	0.24[3]^a	0.05[4]
p	-2.08[4]	-2.86[4]	-4.69[4]^a	-2.21[4]	-2.43[4]	-8.42[4]^a	2.22[4]^a	0.34[4]^a	0.09[4]
e	-0.91[4]	-1.45[4]	-4.47[4]^a	-1.09[4]	-1.68[4]	-9.62[4]^a	0.85[4]^a	0.29[4]^a	0.11[4]
Philippines									
Y_{gdp}	-1.60[4]	-1.55[4]	-5.19[4]^a	-0.84[4]	-10.3[4]	-38.4[4]^a	2.25[4]^a	0.42[4]^a	0.05[4]
psei	-1.18[4]	-1.86[4]	-4.46[4]^a	-1.08[4]	-2.03[4]	-10.2[4]^a	1.39[4]^a	0.30[4]^a	0.07[4]
bnk	-1.79[4]	-2.65[4]	-4.71[4]^a	-1.63[4]	-2.37[4]	-8.51[4]^a	1.61[4]^a	0.27[2]^a	0.08[4]
res	-1.33[4]	-2.04[4]	-4.44[4]^a	-1.07[4]	-2.31[4]	-10.0[4]^a	1.19[4]^a	0.26[4]^a	0.10[4]
m	-1.08[4]	-2.27[4]	-3.52[4]^b	-1.47[4]	-2.53[4]	-15.4[4]^a	2.21[4]^a	0.38[4]^a	0.22[4]
r	-0.90[4]	-1.45[4]	-6.74[4]^a	-1.59[4]	-6.16[4]	-13.0[4]^a	2.08[4]^a	0.15[2]^b	0.04[4]
p	-2.02[4]	-1.12[4]	-4.56[4]^a	6.90[4]	-5.29[4]	-6.46[4]^a	2.20[4]^a	0.48[4]^a	0.20[4]
e	-1.31[4]	-1.42[4]	-5.05[4]^a	-1.86[4]	-1.63[4]	-8.45[4]^a	1.42[4]^a	0.45[4]^a	0.20[4]
Singapore									
Y_{gdp}	-1.32[4]	-2.31[4]	-4.78[4]^a	-1.65[4]	-2.23[4]	-6.85[4]^a	2.20[4]^a	0.30[1]^a	0.19[4]
sti	-1.91[4]	-2.74[7]	-5.69[4]^a	-1.99[4]	-3.07[9]	-9.25[4]^a	1.70[4]^a	0.26[1]^a	0.02[4]
bnk	-1.48[4]	-3.14[7]	-6.21[4]^a	-1.62[4]	-3.04[4]	-9.34[4]^a	2.02[4]^a	0.23[1]^a	0.03[4]
res	-2.23[4]	-2.69[4]	-5.21[4]^a	-2.31[4]	-2.83[4]	-10.0[4]^a	0.80[4]^a	0.28[1]^a	0.03[4]
m	-0.09[4]	-2.08[4]	-3.71[4]^a	-2.06[4]	-2.50[4]	-7.79[4]^a	2.21[4]^a	0.28[2]^a	0.28[6]
r	-2.15[4]	-3.02[1]	-4.68[4]^a	-2.48[4]	-3.15[8]	-8.97[4]^a	1.61[4]^a	0.21[4]^b	0.07[4]
p	-0.35[4]	-1.85[4]	-3.87[4]^a	-0.61[4]	-1.45[4]	-6.46[4]^a	2.09[4]^a	0.36[4]^a	0.13[4]
e	-1.70 [4]	-1.59[4]	-3.47[4]^a	-1.95[4]	-1.75[4]	-10.1[4]^a	1.09[4]^a	0.28[4]^a	0.17[4]

Table 5.1 continued

Thailand									
Y_{gdp}	-2.27[4]	-2.40[4]	-3.90[4]^{a}	-2.47[4]	-2.64[4]	-10.2[4]^{a}	2.22[4]^{a}	0.40[1]^{a}	0.33[4]
set	-1.42[4]	-1.74[4]	-4.28[4]^{a}	-1.44[4]	-1.75[4]	-11.1[4]^{a}	0.89[2]^{a}	0.37[4]^{a}	0.14[4]
bnk	-1.84[4]	-1.83[4]	-3.85[4]^{a}	-2.05[4]	-2.02[4]	-11.3[4]^{a}	0.63[1]^{b}	0.26[4]^{a}	0.10[4]
res	-1.68[4]	-1.30[4]	-3.92[4]^{a}	-1.57[4]	-1.27[4]	-11.1[4]^{a}	0.73[4]^{b}	0.41[4]^{a}	0.20[4]
m	-1.27[4]	-2.80[4]	-5.99[1]^{a}	-2.48[4]	-2.70[4]	-7.05[4]^{a}	2.14[4]^{a}	0.29[4]^{a}	0.33[1]
r	-2.17[5]	-2.61[5]	-6.32[4]^{a}	-2.40[4]	-3.12[4]	-7.94[4]^{a}	1.19[4]^{a}	0.14[4]^{a}	0.03[4]
p	-2.28[4]	-1.58[4]	-4.33[4]^{a}	-2.18[4]	-1.31[4]	-7.09[4]^{a}	2.19[4]^{a}	0.38[4]^{a}	0.31[4]
e	-1.74[4]	-1.62[4]	-4.79[4]^{a}	-1.69[4]	-1.61[4]	-7.12[4]^{a}	1.66[1]^{a}	0.42[4]^{a}	0.12[4]

Notes:

1. a ,b and c represents significant level at 1 percent, 5 percent and 10 percent respectively. τ_{μ} represents the model with intercept; and, τ_{τ} is the model with trend and intercept. Numbers in brackets are number of lags used in the ADF test in order to remove serial correlation in the residuals.
2. At n=103 the ADF critical values are -3.49 (1 percent), -2.88 (5 percent), and -2.58 (10 percent) for intercept (τ_{μ}); -4.04 (1 percent), -3.45 (5 percent), -3.15 (10 percent) for trend and intercept (τ_{τ}); PP critical values are -3.49 (1 percent), -2.88 (5 percent), and -2.58 (10 percent) for intercept (τ_{μ}); -4.04 (1 percent), -3.45 (5 percent), -3.15 (10 percent) for trend and intercept (τ_{τ}).
3. KPSS critical values are 0.73 (1 percent), 0.46 (5 percent), and 0.34 (10 percent) for intercept (τ_{μ}); 0.21 (1 percent), 0.14 (5 percent), 0.11 (10 percent) for trend and intercept (τ_{τ}).

5.3 Cointegration Test

The results of the Johansen and Juselius (JJ) (1992) cointegration tests in the presence of linear trends are reported in Table 5.2. The tests detects whether the non-stationary series are cointegrated. The endogenous variables are stock price indices (jkse, klse, psei, sti and set), stock market indices (banks and real estate), economic growth (Y_{gdp}), the broad money M3 (m), the interest rate (r), inflation (p), and the exchange rate (e). The exogenous variables included in the model are seasonal dummies and financial dummy representing financial crisis event in 1997 and 2008. The selection of optimal lag length (k) for cointegration test is selected based on the need of the model to have desirable statistical properties (no serial correlation, normality, homoskedastic variance and correct model specification) rather than using some information theoretic criterion (AIC and SBC). The lag length that adequately provides satisfactory diagnostic statistics in this study is given in the Table 5.2

The results of cointegration test are reported by λ-max and trace statistics. The critical values computed by the Microfit 5.0 are based on Pesaran et al. (2000).[14] According to the trace and maximum eigenvalue outcomes at 5 percent significance level, it is suggested that economic growth shares the long-run path with stock market, bank, real estate, broad money M3 (m), the interest rate (r), inflation (p), and the exchange rate (e). Both tests statistics reject the null hypothesis of no cointegration (r = 0) at the 5 percent significant level in most of the cases. There is at least one cointegrating vector at 5 percent significant level. This indicates the presence of cointegrating among the variables. That is, there exists a unique cointegrating vector in the model that constraints the long-run movements of the variables. However, it is possible that if the series are greater than two (r > 2) there can be more than one

[14] The eigenvalue and trace statistics reported by Microfit 5.0 and Eviews 9.0 are almost similar. Eviews critical values are from Osterwald-Lenum (1992). Generally, the critical values computed by Johansen and Juselius (1992), Pesaran et al. (2000) and Osterwald-Lenum (1992) not much different.

cointegrating vectors. For example, there are two cointegrating vectors in VAR model of stock market, bank and real estate in Indonesia, Malaysia, Philippines, Singapore and Thailand.

Table 5.2: Cointegration Test of GDP with Stock Return Indices for ASEAN-5

Hypothesis			Critical Value		Critical Value
H_0	H_1	Max Eigenvalue	λMax	Trace	λTrace
Indonesia					
Vector: [Y_{gdp}, jkse, m, r, p, e] k=6					
r = 0	r = 1	66.4897[b]	39.8300	182.8125[b]	95.8700
r ≤ 1	r = 2	46.1174[b]	33.6400	96.3227[b]	70.4900
r ≤ 2	r = 3	22.7473	27.4200	40.2053	48.8800
r ≤ 3	r = 4	19.2995	21.1200	28.4580	31.5400
r ≤ 4	r = 5	14.2206	14.8800	15.1586	17.8600
r ≤ 5	r = 6	.93795	8.0700	.93795	8.0700
Vector : [Y_{gdp}, bnk, m, r, p, e] k=7					
r = 0	r = 1	57.8417[b]	39.8300	137.1154[b]	95.8700
r ≤ 1	r = 2	30.0818	33.6400	79.2736 [b]	70.4900
r ≤ 2	r = 3	23.1778	27.4200	43.1918	48.8800
r ≤ 3	r = 4	18.5533	21.1200	26.0140	31.5400
r ≤ 4	r = 5	5.5615	14.8800	7.4607	17.8600
r ≤ 5	r = 6	1.8992	8.0700	1.8992	8.0700
Vector : [Y_{gdp}, res, m, r, p, e] k=7					
r = 0	r = 1	48.2925[b]	39.8300	135.9988[b]	95.8700
r ≤ 1	r = 2	38.1905[b]	33.6400	87.7063[b]	70.4900
r ≤ 2	r = 3	21.8004	27.4200	43.5158	48.8800
r ≤ 3	r = 4	16.9427	21.1200	27.7154	31.5400
r ≤ 4	r = 5	9.5984	14.8800	10.7727	17.8600
r ≤ 5	r = 6	1.1743	8.0700	1.1743	8.0700
Malaysia					
Vector : [Y_{gdp}, klse, m, r, p, e] k=5					
r = 0	r = 1	69.2276[b]	39.8300	158.9432[b]	95.8700
r ≤ 1	r = 2	45.0357[b]	33.6400	89.7156[b]	70.4900
r ≤ 2	r = 3	22.3801	27.4200	44.6799	48.8800
r ≤ 3	r = 4	12.6292	21.1200	22.2998	31.5400
r ≤ 4	r = 5	9.5207	14.8800	9.6706	17.8600
r ≤ 5	r = 6	.14993	8.0700	.14993	8.0700
Vector : [Y_{gdp}, bnk, m, r, p, e] k=6					
r = 0	r = 1	63.4687[b]	39.8300	153.4596[b]	95.8700
r ≤ 1	r = 2	51.1141[b]	33.6400	89.9909[b]	70.4900
r ≤ 2	r = 3	23.5106	27.4200	38.8768	48.8800
r ≤ 3	r = 4	10.5967	21.1200	15.3662	31.5400
r ≤ 4	r = 5	4.7551	14.8800	4.7695	17.8600
r ≤ 5	r = 6	.014395	8.0700	.014395	8.0700
Vector : [Y_{gdp}, res, m, r, p, e] k=5					
r = 0	r = 1	66.4899[b]	39.8300	148.5301[b]	95.8700
r ≤ 1	r = 2	46.0120[b]	33.6400	82.0402[b]	70.4900
r ≤ 2	r = 3	19.2232	27.4200	36.0282	48.8800
r ≤ 3	r = 4	9.8362	21.1200	16.8050	31.5400
r ≤ 4	r = 5	6.9042	14.8800	6.9688	17.8600
r ≤ 5	r = 6	.064634	8.0700	.064634	8.0700

Table 5.2 continued

Philippines					
Vector : [Y_{gdp}, psei, m, r, p, e] k=4					
r = 0	r = 1	54.6973[b]	39.8300	119.3943[b]	95.8700
r ≤ 1	r = 2	30.8035	33.6400	64.6970	70.4900
r ≤ 2	r = 3	17.8766	27.4200	33.8935	48.8800
r ≤ 3	r = 4	11.5259	21.1200	16.0168	31.5400
r ≤ 4	r = 5	3.7223	14.8800	4.4910	17.8600
r ≤ 5	r = 6	.76865	8.0700	.76865	8.0700
Vector : [Y_{gdp}, bnk, m, r, p, e] k=4					
r = 0	r = 1	43.5082[b]	39.8300	114.3142	95.8700
				[b]	
r ≤ 1	r = 2	35.9200[b]	33.6400	70.8061[b]	70.4900
r ≤ 2	r = 3	17.8049	27.4200	34.8860	48.8800
r ≤ 3	r = 4	12.5975	21.1200	17.0811	31.5400
r ≤ 4	r = 5	3.5122	14.8800	4.4836	17.8600
r ≤ 5	r = 6	.97133	8.0700	.97133	8.0700
Vector : [Y_{gdp}, res, m, r, p, e] k=4					
r = 0	r = 1	49.0952[b]	39.8300	122.6526[b]	95.8700
r ≤ 1	r = 2	42.0228[b]	33.6400	73.5573[b]	70.4900
r ≤ 2	r = 3	15.4838	27.4200	31.5346	48.8800
r ≤ 3	r = 4	11.0149	21.1200	16.0508	31.5400
r ≤ 4	r = 5	4.2368	14.8800	5.0359	17.8600
r ≤ 5	r = 6	.79906	8.0700	.79906	8.0700
Singapore					
Vector : [Y_{gdp}, sti, m, r, p, e] k=5					
r = 0	r = 1	49.1032[b]	39.8300	132.7450[b]	95.8700
r ≤ 1	r = 2	35.1368[b]	33.6400	83.6417[b]	70.4900
r ≤ 2	r = 3	24.4057	27.4200	48.5050	48.8800
r ≤ 3	r = 4	11.2714	21.1200	24.0992	31.5400
r ≤ 4	r = 5	8.5783	14.8800	12.8278	17.8600
r ≤ 5	r = 6	4.2495	8.0700	4.2495	8.0700
Vector : [Y_{gdp}, bnk, m, r, p, e] k=6					
r = 0	r = 1	51.1518[b]	39.8300	135.5042[b]	95.8700
r ≤ 1	r = 2	36.4397[b]	33.6400	84.3524[b]	70.4900
r ≤ 2	r = 3	21.4842	27.4200	47.9127	48.8800
r ≤ 3	r = 4	16.5189	21.1200	26.4286	31.5400
r ≤ 4	r = 5	6.8574	14.8800	9.9097	17.8600
r ≤ 5	r = 6	3.0523	8.0700	3.0523	8.0700
Vector : [Y_{gdp}, res, m, r, p, e] k=7					
r = 0	r = 1	55.7203[b]	39.8300	170.9351[b]	95.8700
r ≤ 1	r = 2	46.0463[b]	33.6400	85.2148[b]	70.4900
r ≤ 2	r = 3	27.1077	27.4200	39.1684	48.8800
r ≤ 3	r = 4	17.3655	21.1200	22.0607	31.5400
r ≤ 4	r = 5	9.4645	14.8800	14.6952	17.8600
r ≤ 5	r = 6	5.2307	8.0700	5.2307	8.0700
Thailand					
Vector : [Y_{gdp}, set, m, r, p, e] k=7					
r = 0	r = 1	49.3866[b]	39.8300	141.8713[b]	95.8700
r ≤ 1	r = 2	39.9645[b]	33.6400	92.4846[b]	70.4900
r ≤ 2	r = 3	26.4801	27.4200	42.5201	48.8800
r ≤ 3	r = 4	15.7061	21.1200	22.0400	31.5400
r ≤ 4	r = 5	5.7599	14.8800	6.3339	17.8600
r ≤ 5	r = 6	.57400	8.0700	.57400	8.0700

Table 5.2 continued

Vector : [Y_{gdp}, bnk, m, r, p, e] k=8					
r = 0	r = 1	69.1737[b]	39.8300	146.5161[b]	95.8700
r ≤ 1	r = 2	34.0508[b]	33.6400	77.3424[b]	70.4900
r ≤ 2	r = 3	19.2886	27.4200	43.2916	48.8800
r ≤ 3	r = 4	15.9785	21.1200	24.0030	31.5400
r ≤ 4	r = 5	8.0245	14.8800	8.0245	17.8600
r ≤ 5	r = 6	.45494	8.0700	.45494	8.0700
Vector : [Y_{gdp}, res, m, r, p, e] k=8					
r = 0	r = 1	57.9305[b]	39.8300	174.1407[b]	95.8700
r ≤ 1	r = 2	46.1888[b]	33.6400	96.2102[b]	70.4900
r ≤ 2	r = 3	27.3699	27.4200	42.0214	48.8800
r ≤ 3	r = 4	22.7196	21.1200	22.6515	31.5400
r ≤ 4	r = 5	16.1827	14.8800	14.9318	17.8600
r ≤ 5	r = 6	3.7491	8.0700	3.7491	8.0700

Notes:

1. [b] denote significant at 5 percent levels respectively. λ_{trace} and λ_{max} are the likelihood ratio statistics for the number of cointegrating vectors.
2. Cointegrating vector includes intercept, time trend, seasonal dummies and dummy for outliers.

5.4 Parsimonious Error-Correction Model (PECM)

Having acquired long-term cointegration relationships, it is now possible to estimate economic growth using an error correction model framework (ECM). The number of lags is similar to that used in the cointegration test. The main importance of the analysis is to study stock market on growth and to link the effects of the financial crisis of 1997 and 2008. To take into account this event, the dummy variable is added to the regression to measure its effect. The identified financial crisis period takes on a value of one and in other periods, zero. Dummy crisis tested are CRISIS97 and CRISIS08. The PECM results represent three different analyzes. The first study incorporates CRISIS97 and CRISIS08, and then separates CRISIS97 and CRISIS08.

The essential finding of the estimates is a negatively significant error correction term (ECT) in all the estimated models. This estimation implies that the speed at which a dependent variable returns to equilibrium after a change in an independent variable. Some parts of the current variation and dynamics of the economic growth (Y_{gdp}) are explained by the ECT. The coefficient measures the speed of adjustment in the short-run responses toward restoring the long-run equilibrium in the system. The negative coefficient indicates the system is stable.

The robustness of the results is evaluated from the diagnostic test which consists of serial correlation, misspecification regression, normality and heteroskedasticity. The estimated values are based on chi-squares (χ^2) and F-statistics except normality test which refer to just the chi-squares (χ^2) statistics. Serial correlation is test up to the fourth lag, functional test is RESET (regression specification error test) test by Ramsey (1969), normality test is based on the Jarque-Bera (1981) test, heteroskedasticity test is based on the regression of squared residuals on squared fitted values. The overall diagnostic tests are found to be satisfactorily. The residuals have normal distribution. The insignificant

serial correlation test indicates that the residuals are white noise. RESET test supports that the models are correctly specified.

To keep the model as simple as possible, the insignificant regressors are removed from the equation. The model follows the general-to-specific modeling process. Variables with t-statistics less than one are first considered for the deletion. A variable is statistically significant if the *p* value is less than 10 percent significant level. However, there are some insignificant variables retained in the final model. This is because the variables capture the interest of the study and to avoid problem in misbehaved residuals. Also, dropping the variables may lead to specifications error that may seriously bias estimating the true values of the coefficient. In fact, the variables are jointly significant judging from the significant *F* statistics with a very small *p* values (0.000). Tables 5.4a – 5.4e represent the results from the parsimonious error correction estimations of five ASEAN countries.

5.4.1 Indonesia

Table 5.4a(i) – 5.4a(iii) present the results from the PECM estimations of Indonesia using data from 1990Q1 to 2016Q4. The result of PECM with crisis 1997 and 2008 reveals that Indonesia is the most affected by the 1997 Asian financial crisis instead of 2008 global financial crisis. The dummy crisis is run to measure the shocks of financial crisis on economic growth. However, only the crisis dummy of CRISIS97 is significant and has a negative sign. The crisis that occurs in 1997 has major effects on the economy activity. There was severe output disruption in 1998. The Indonesian economy had plunged into a deep recession in 1998 with overall growth at -13.7 percent (Badan Pusat Statistik Indonesia, 2012). The crisis also led to a significant drop in output and a significant increase in poverty rate. The increase in poverty and the decline in income per capita were consistent with output contractions. In fact, by the end of 1997 16 commercial banks were closed and access to credit became very difficult and interest rate increased significantly. This has contributed significantly to output contractions in many sectors in Indonesia. The output fall may simply reflect the current value of economic growth is strongly related to its past value combined with the crisis that still present in that period.

The estimation results of economic growth with stock market indices with crisis 1997 and crisis 2008 are reported in Table 5.4a(i). Stock market indices of JKSE is not neutral in the short-run and it has a significant effects on economic growth in the long-run. The short-run fluctuations of broad money in quarter two and quarter five has significant effect to economic growth. The economic growth reacts to the deviations in the long-run disequilibrium by closing 11.6 percent of the gap. The interest rate and exchange rate has negative sign and has significant effect on economic growth in the short-run. Despite dummy variables introduced to represent the crisis in 1997 and 2008, only CRISIS97 is significant and has a negative sign. The crisis that occurs in 1997Q2

to 1999Q4 has major effects on the economy activity. Similarly, bank show an evidence of positive effect on economic growth in the short-run. The significant and negative sign in the error correction coefficient suggests that bank has some effects on economic growth in the long-run. About 4.5 percent of the long-run disequilibrium is eliminated by economic growth in that period. Inflation affects economic growth significantly at quarter five and six. There is strong evidence that the effect of exchange rate on economic growth is negative. It suggests that the appreciation in the rupiah exchange drives economic growth higher in that quarter. Real estate is important in Indonesia. The coefficient of real estate is not neutral and it affects economic growth in both the short-run and the long-run. The results from the PECM estimations show the real estate is statistically positive and significant, but the contribution is small on economic growth. The estimated elasticity of economic growth with respect to real estate is 0.022 which reflects a 0.022 percent increase in economic growth from a 1 percent rise in real estate. This finding is consistent with the report by the World Bank (2013) that the Indonesian property market showed very weak growth as compared to other Asian countries. Unpredictable inflation rates and an increase in the number of construction projects has led to the poor performance of real estate market and hampered the growth of housing market. All the variables examined are important both in the short-run and the long-run. Economic growth adjusts by 5.1 percent (0.051) to push back the economy towards the equilibrium.

Table 5.4a(ii) present the results from the PECM estimation of Indonesia stock market indices with crisis 1997. There is no evidence on significant effect of CRISIS97 on economic growth in stock market and real estate estimation model. However, the coefficient of dummy CRISIS97 is negative and significant in the bank estimation model. Dummy CRISIS97 is significant and has positive effects on economic growth. This analysis confirm that the economic growth is influenced by stock market, bank and

real estate indices in the short-run as well as in the long run. From the long-run effect of stock market, bank and real estate, the economic growth moves to eliminate the discrepancy between the short-run and long-run equilibrium by 4.0 percent, 4.6 percent and 4.9 percent respectively. All the monetary variables examined are important both in the short-run as well as in the long-run. The finding supports the evidence that broad money is significant in transmitting the effects of monetary policy on the economy (Agung, 1998). Financial liberalization in Indonesia has made broad money become relatively important. It is believed that a very high interest rate return in deposit attracts people to demand more broad money.

Findings from Table 5.4a(iii) for the stock market equation shows there is an evidence of positive correlation of JKSE in the short-run. The response of economic growth to changes in stock market is found significant and has positive sign. For every 1 percent change in stock market, economic growth rises by 0.06 percent. The error correction coefficient is negative and significant. Economic growth adjusts by 4.5 percent to push back the economy towards equilibrium. Similarly, the findings support bank is important in Indonesia. Bank effects economic growth in the short-run as well as in the long-run. The elasticity of economic growth with respect to banks is 0.03 percent at three-quarter lag. A 1 percent increases in bank returns increases economic growth by 0.03 percent. From the long-run effect of bank, the economic growth moves to eliminate the discrepancy between the short-run and the long-run equilibrium by 7.2 percent (0.072). The interest rate and inflation is significant and carries expected sign. The findings show that exchange rate is important and has negative sign. It implies that firm rupiah exchange expands economic growth. The real estate also effect on economic growth in the short-run. The coefficient of real estate has a right sign and it is statistically significant. Referring to this error correction coefficient, economic growth adjusts by closing 7.3 percent of the disequilibrium in the system moving towards the

steady state economy. The effect of interest rate is very small, significant and has right sign. Inflation is important and has greater effects than any other variables included in the equation. Evidence from real estate equation supports the role of exchange rate cannot be rejected. Consistent with the findings in Table 5.4a(i), the PECM estimation of Indonesia stock market indices with crisis 2008 clearly support CRISIS08 has no effect on economic growth in Indonesia. Dummy variables added to the model to capture the effects of global financial crisis on the economy fail to get any significant effects. Indonesia is not spread from being affected by the global financial crisis in the 2008. The effect of the global financial crisis on the Indonesian economy is very limited (Table 3.5). The Indonesian economic growth as a whole still managed to reach 6.2 percent in 2012, and this growth was considered the highest in Asia. The reason behind the good performance of the Indonesian economy is due to the huge domestic demand. The huge domestic demand was able to insulate the economy from the ravages of the global recession. Indonesia has increases its domestic demand in GDP to the high of 97.0 percent in 2008 from 88.0 percent in 2000. Unlike the other governments in Southeast Asia, the Indonesian government did not face the necessity of implementing massive stimulus packages.

Table 5.4a(i): PECM of Real GDP with Stock Market Indices for Indonesia with Crisis 1997 and 2008

Dependent variable is ΔY_{gdp}
Sample 1990:1 – 2016:4

JKSE		**BNK**		**RES**	
Regressor	Coefficient	Regressor	Coefficient	Regressor	Coefficient
INT	1.4320[a]	INT	.81373[a]	INT	.75100[a]
ΔY_{t-1}	-.44118[a]	ΔY_{t-2}	-.18904[b]	ΔY_{t-3}	-.18220
ΔY_{t-2}	-.38240[a]	ΔY_{t-3}	-.23583[b]	ΔY_{t-4}	.25058[b]
ΔY_{t-3}	-.24431[b]	ΔY_{t-5}	.24855[b]	ΔY_{t-5}	.21720[c]
ΔY_{t-5}	.12534	ΔY_{t-7}	.051684	ΔRES_{t-2}	.013582
ΔIDX_{t-1}	-.023902	ΔBNK_{t-3}	.030605[b]	ΔRES_{t-3}	.015370
ΔIDX_{t-3}	.043075[b]	ΔBNK_{t-5}	.0083442	ΔRES_{t-5}	.022212[b]
ΔIDX_{t-4}	.035863[c]	ΔBNK_{t-6}	.016659	Δm_{t-3}	.10575
ΔIDX_{t-5}	.040428[b]	Δm_{t-5}	.21684[a]	Δm_{t-4}	.14696
ΔIDX_{t-6}	-.025632	Δm_{t-6}	.22566[b]	Δm_{t-5}	-.31297[b]
Δm_{t-2}	.28623[b]	Δr_{t-1}	.023282	Δm_{t-6}	-.22855[c]
Δm_{t-5}	.23329[c]	Δr_{t-2}	-.055361[a]	Δr_{t-1}	-.049313[a]
Δm_{t-1}	.14414	Δr_{t-3}	-.026043[b]	Δr_{t-2}	-.043009[a]
Δr_{t-1}	-.065642[a]	Δr_{t-4}	-.027331[b]	Δr_{t-3}	-.036479[b]
Δr_{t-2}	.026589	Δr_{t-5}	-.065132[a]	Δr_{t-4}	.017038
Δr_{t-3}	-.023121	Δr_{t-6}	-.033037	Δr_{t-5}	-.049495[a]
Δr_{t-4}	-.026813[c]	Δp_{t-3}	.14773	Δr_{t-6}	-.042960[b]
Δr_{t-5}	-.046049[a]	Δp_{t-5}	-.44045[b]	Δp_{t-2}	-.21602
Δr_{t-6}	-.046008[a]	Δp_{t-6}	-.36341[a]	Δp_{t-3}	.21382
Δp_{t-2}	-.049792	Δe_{t-1}	-.052945[c]	Δp_{t-4}	.29604
Δp_{t-3}	-.49378[a]	Δe_{t-2}	-.096397[a]	Δp_{t-5}	-.36198[c]
Δp_{t-4}	-.30134[c]	Δe_{t-4}	-.075547[b]	Δp_{t-6}	-.43112[b]
Δp_{t-5}	-.49061[b]	CRISIS97	-.026143[b]	Δe_{t-1}	-.10176[a]
Δp_{t-6}	.13349	CRISIS08	.0018722	Δe_{t-2}	-.10367[a]
Δe_{t-1}	-.066399[c]	SR1	.029430[a]	Δe_{t-4}	-.058549
Δe_{t-2}	-.14389[a]	ECT_{t-1}	-.045435[a]	Δe_{t-5}	-.11424[b]
Δe_{t-4}	-.12022[a]	ECT_{t-2}	.024096[a]	Δe_{t-7}	.049314
Δe_{t-5}	-.093796[b]			CRISIS97	-.0054223
CRISIS97	-.021835[c]			CRISIS08	-.0099817
CRISIS08	-.0064648			SR1	.026052[a]
ECT_{t-1}	-.11605[a]			SR3	-.0043018
ECT_{t-2}	.080231[a]			ECT_{t-1}	-.051979[a]
				ECT_{t-2}	.026931[b]
R^2	.80715	R^2	.79771	R^2	.84210
AIC	230.8079	AIC	230.3496	AIC	236.6127
F-stat. F(31,68)	9.1810[.000]	F-stat. F(26,72)	10.9200[.000]	F-stat. F(32,66)	10.9994[.000]
χ^2_{SC}[4]	4.3044[.366]	χ^2_{SC}[4]	3.5520[.470]	χ^2_{SC}[4]	1.0412[.903]
χ^2_{FF}[1]	2.4853[.115]	χ^2_{FF}[1]	3.6359[.057]	χ^2_{FF}[1]	17.1051[.000]
χ^2_{N}[2]	.96635[.617]	χ^2_{N}[2]	.50530[.777]	χ^2_{N}[2]	.80745[.668]
χ^2_{H}[1]	.50294[.478]	χ^2_{H}[1]	.21109[.646]	χ^2_{H}[1]	1.3426[.247]

Table 5.4a (ii): PECM of Real GDP with Stock Market Indices for Indonesia with Crisis 1997

Dependent variable is ΔY_{gdp}
Sample 1990:1 – 2016:4

JKSE		**BNK**		**RES**	
Regressor	Coefficient	Regressor	Coefficient	Regressor	Coefficient
INT	.42488[a]	INT	.79967[a]	INT	.55136[a]
ΔY_{t-3}	-.083336	ΔY_{t-2}	-.10087	ΔY_{t-2}	-.18957[b]
ΔY_{t-4}	.23482[b]	ΔY_{t-3}	-.22750[b]	ΔY_{t-3}	-.16429[c]
ΔY_{t-5}	.29692[a]	ΔY_{t-5}	.26167[b]	ΔY_{t-4}	.18672[c]
ΔY_{t-6}	-.19373[b]	ΔY_{t-7}	.084628	ΔY_{t-5}	.21461[b]
ΔIDX_{t-2}	.032025[c]	ΔBNK_{t-3}	.036820[a]	ΔRES_{t-1}	.013586
ΔIDX_{t-3}	.072177[a]	ΔBNK_{t-5}	.015575	ΔRES_{t-3}	.020360[c]
ΔIDX_{t-5}	.010573	ΔBNK_{t-6}	.019119	Δm_{t-4}	.21717[c]
ΔIDX_{t-6}	.050948[a]	Δm_{t-5}	.37280[a]	Δm_{t-6}	.11825
Δm_{t-2}	.25332[b]	Δm_{t-6}	.31434[a]	Δr_{t-1}	-.040171[b]
Δm_{t-3}	-.081591	Δr_{t-1}	-.025772[c]	Δr_{t-2}	-.049065[a]
Δm_{t-5}	.19487[b]	Δr_{t-2}	-.051923[a]	Δr_{t-3}	-.032276[b]
Δr_{t-1}	-.018858	Δr_{t-3}	-.020079	Δr_{t-4}	-.028708[b]
Δr_{t-2}	-.057708[a]	Δr_{t-4}	-.023563[c]	Δr_{t-5}	-.049025[a]
Δr_{t-3}	.016782	Δr_{t-5}	-.062941[a]	Δr_{t-6}	-.020641
Δr_{t-4}	-.029960[b]	Δr_{t-6}	-.040265[a]	Δp_{t-2}	.041630
Δr_{t-5}	-.059335[a]	Δp_{t-1}	-.059687	Δp_{t-3}	.21873
Δr_{t-6}	-.023009[c]	Δp_{t-3}	.15596	Δp_{t-4}	-.33628[b]
Δp_{t-5}	.25779	Δp_{t-5}	-.43463[b]	Δp_{t-5}	-.36874[b]
Δp_{t-6}	-.43110[a]	Δp_{t-6}	-.42298[a]	Δp_{t-6}	-.42260[a]
Δe_{t-1}	-.053508[b]	Δe_{t-1}	-.071775[b]	Δe_{t-1}	-.052476[c]
Δe_{t-2}	-.12210[a]	Δe_{t-2}	-.093356[a]	Δe_{t-2}	-.094142[a]
Δe_{t-4}	-.047096[c]	Δe_{t-4}	-.068007[b]	Δe_{t-4}	-.041435
Δe_{t-6}	-.085296[a]	Δe_{t-5}	-.076457[c]	CRISIS97	-.018116
CRISIS97	-.013517	CRISIS97	-.024212[c]	SR1	.027653[a]
SR1	.024067[a]	SR1	.030188[a]	ECT_{t-1}	.035201[b]
ECT_{t-1}	-.0028683	ECT_{t-1}	-.046218[a]	ECT_{t-2}	-.049425[a]
ECT_{t-2}	-.040277[b]	ECT_{t-2}	.030288[a]		
R^2	.83176	R^2	.80425	R^2	.78659
AIC	238.4722	AIC	230.9758	AIC	230.7413
F-stat. F(27,71)	13.0002[.000]	F-stat. F(27,71)	10.8037[.000]	F-stat. F(26,73)	10.3485[.000]
χ^2_{SC}[4]	2.5773[.631]	χ^2_{SC}[4]	2.6574[.617]	χ^2_{SC}[4]	1.3393[.855]
χ^2_{FF}[1]	2.7295[.099]	χ^2_{FF}[1]	4.5010[.034]	χ^2_{FF}[1]	11.8789[.001]
χ^2_{N}[2]	.59838[.741]	χ^2_{N}[2]	.050815[.975]	χ^2_{N}[2]	1.9649[.374]
χ^2_{H}[1]	2.6799[.102]	χ^2_{H}[1]	.32933[.566]	χ^2_{H}[1]	2.7026[.100]

Table 5.4a (iii): PECM of Real GDP with Stock Market Indices for Indonesia with Crisis 2008

Dependent variable is ΔY_{gdp}
Sample 1990:1 – 2016:4

JKSE		**BNK**		**RES**	
Regressor	Coefficient	Regressor	Coefficient	Regressor	Coefficient
INT	1.0259[a]	INT	1.0934[a]	INT	.79506[a]
ΔY_{t-3}	-.011104	ΔY_{t-1}	-.19746[c]	ΔY_{t-3}	-.19117
ΔY_{t-4}	.18939[b]	ΔY_{t-3}	-.29601[a]	ΔY_{t-4}	.35088[a]
ΔY_{t-5}	.37990 [a]	ΔY_{t-5}	.23823[b]	ΔY_{t-5}	.21935[c]
ΔIDX_{t-3}	.067791[a]	ΔY_{t-6}	-.25060[a]	ΔRES_{t-2}	.015961
ΔIDX_{t-5}	.025255	ΔBNK_{t-1}	.017920	ΔRES_{t-3}	.014948
ΔIDX_{t-6}	.040130[b]	ΔBNK_{t-2}	.010886	ΔRES_{t-5}	.020733[c]
Δm_{t-1}	.25292[b]	ΔBNK_{t-3}	.037200[a]	ΔRES_{t-6}	.0085000
Δm_{t-2}	.38805[a]	ΔBNK_{t-5}	021128[c]	Δm_{t-3}	.16330
Δm_{t-3}	.14494	ΔBNK_{t-6}	.021927[c]	Δm_{t-4}	.29442[b]
Δm_{t-5}	.17010[b]	Δm_{t-3}	.23649[b]	Δm_{t-6}	-.099736
Δm_{t-7}	.10235	Δm_{t-4}	.32435[b]	Δr_{t-1}	-.061008[a]
Δr_{t-1}	-.044108[a]	Δm_{t-6}	.14156	Δr_{t-2}	-.030360[c]
Δr_{t-2}	-.032188[b]	Δr_{t-1}	-.027021[c]	Δr_{t-3}	-.033901[b]
Δr_{t-3}	-.034838[b]	Δr_{t-2}	-.040141[b]	Δr_{t-5}	-.031462[b]
Δr_{t-4}	-.034380[a]	Δr_{t-4}	-.030835[b]	Δr_{t-6}	-.035865[c]
Δr_{t-5}	-.051949[a]	Δr_{t-5}	-.047777[a]	Δp_{t-1}	-.12977
Δr_{t-6}	-.033358[b]	Δr_{t-6}	-.028940[b]	Δp_{t-2}	-.19688
Δp_{t-3}	-.22294	Δp_{t-2}	-.37844[b]	Δp_{t-3}	-.36868[c]
Δp_{t-5}	-.38832[b]	Δp_{t-3}	-.32779[c]	Δp_{t-4}	-.57025[a]
Δp_{t-6}	.13882	Δp_{t-4}	-.29697[c]	Δp_{t-5}	-.44831[b]
Δe_{t-1}	-.14416[a]	Δp_{t-5}	-.46869[b]	Δp_{t-6}	.22980
Δe_{t-2}	-.17285[a]	Δp_{t-6}	-.47148[a]	Δe_{t-1}	-.10821[a]
Δe_{t-3}	.035050	Δe_{t-1}	-.082879[a]	Δe_{t-2}	-.10930[a]
Δe_{t-4}	-.078056[a]	Δe_{t-2}	-.098542[a]	Δe_{t-4}	.040016
Δe_{t-6}	-.039058	Δe_{t-4}	.026056	Δe_{t-5}	-.080169[b]
CRISIS08	-.0090128	Δe_{t-5}	-.078975[b]	Δe_{t-7}	-.076362[b]
SR1	.023317[a]	CRISIS08	-.0082845	CRISIS08	-.0071110
ECT_{t-1}	-.045003[a]	SR1	.026750[a]	SR1	.026593[a]
ECT_{t-2}	.040958[a]	ECT_{t-1}	-.072371[a]	SR3	-.0068112
		ECT_{t-2}	-.057536[a]	ECT_{t-1}	-.073137[a]
				ECT_{t-2}	.027738[b]
R^2	.83183	R^2	.81501	R^2	.79494
AIC	236.4934	AIC	233.8869	AIC	224.6765
F-stat. F(29,69)	11.7687[.000]	F-stat. F(0,69)	10.1330[.000]	F-stat. F(31,67)	8.3784[.000]
χ^2_{SC} [4]	5.3163[.256]	χ^2_{SC} [4]	4.8085[.308]	χ^2_{SC} [4]	.94780[.918]
χ^2_{FF} [1]	2.5885[.108]	χ^2_{FF} [1]	9.9632[.002]	χ^2_{FF} [1]	15.7718[.000]
χ^2_{N} [2]	.73275[.693]	χ^2_{N} [2]	.62779[.731]	χ^2_{N} [2]	.32368[.851]
χ^2_{H} [1]	.50618[.477]	χ^2_{H} [1]	2.5124[.113]	χ^2_{H} [1]	2.3102[.129]

5.4.2 Malaysia

Results from the PECM of economic growth with stock markets indices with crisis 1997 and 2008 are reported in Table 5.4b(i). The stock market and real estate equations are estimated with five lag, while bank equation is estimated with six lag. The results show that the economic growth is influenced by the stock market in the short-run as well as in the long-run. The elasticity of economic growth with respect to stock market is 0.07 percent at two and three-quarter lag. The economic growth reacts to the deviations in the long-run disequilibrium by closing 5.3 percent of the gap. The interest rate has significant effect on economic growth in the short-run. Exchange rate is important and has negative sign. Dummy variables were introduced to represent the crisis in 1997 and 2008, only CRISIS97 is significant and has a negative sign. The crisis that occurs in 1997 has major effects on the economic activity. The Malaysian economy experienced a 7.4 percent contraction in GDP in 1998. The output fall may simply reflect that the current value of economic growth is strongly related to its past value combined with the crisis that still present in that period. Similarly, the findings support bank is important in Malaysia. Bank effects economic growth in the short-run as well as in the long-run. The elasticity of economic growth with respect to banks is 0.08 percent at two-quarter lag. A 1 percent increases in bank raises economic growth by 0.08 percent. From the long-run effect of bank, the economic growth moves to eliminate the discrepancy between the short-run and the long-run equilibrium by 5.6 percent (0.056). The interest rates with three-quarter lag or five-quarter lag are found significant but the effects are very small (0.013 percent or 0.011 percent). The inflation is significant and carries expected sign. The findings show that exchange rate is important and has negative sign. It implies that firm ringgit exchange expands economic growth. The real estate is equally important as stock market and banks. The findings show that the economic growth is influenced by real estate. The estimation of economic growth with

real estate show the coefficient is positive and significant at five-quarter lag with the elasticity in the range of 0.03 percent. Nevertheless, the response of economic growth to changes in real estate is smaller compared to those found in stock market and banks equations. For every 1 percent changes in real estate, economic growth rises by 0.03 percent. The error correction coefficient is negative and significant. Economic growth adjusts by 6.6 percent (0.066) to push back the economy towards equilibrium. From the short-run estimates of exchange rate, economic growth is affected negatively.

The estimates of economic growth with stock market indices for Malaysia with Crisis 1997 is given in Table 5.4b (ii). The stock market equation is estimated with seven lag. Stock market is not neutral and it has significant effects on economic growth in the short-run. The economic growth reacts to the deviations in the long-run disequilibrium by closing 3.6 percent of the gap. From the stock market equation, this analysis confirms that the Asian financial crisis has major effects on the economic activity in Malaysia. Between July and December 1997, the composite index of the Kuala Lumpur stock exchange (KLSE) fell by 44.9 percent. In September 1998, market capitalization in the KLSE fell about 76 percent to RM 181.5 billion. The weak stock prices and ringgit depreciation lead to a negative effect on economic growth. From the bank equation, the findings reveal that bank is equally important as stock market. Like stock market, bank has significant influence on the economic growth in the short-run as well as in the long-run. The coefficient of adjustment, which is 4.6 percent, is higher than the stock market and real estate. The inflation and exchange rate are important in economic growth. The dummy CRISIS97 in this model does not show significant sign. This indicates that the CRISIS97 dummy and the past value of current economic growth do not affect economic growth significantly. This analysis confirms that real estate is important to economic growth over the period 1990Q1 to 2016Q4. It affects economic growth in both the short-run and the long-run. Economic growth adjusts by 3.8 percent

to the disequilibrium in the long-run relationship. Interest rate has small effect on economic growth. Even if it is significant, the value is very small (0.016). Interestingly, the estimated inflation coefficient is the largest compared to all monetary variables. This indicates that inflation has more real effects on growth than other nominal variables. A 1 percent increases in the inflation causes economic growth to grow by an approximately 1.20 percent.

Consistent with the findings in Table 5.4b (i), the PECM estimation of Malaysia stock market indices with crisis 2008 reported in Table 5.4b(iii) clearly support CRISIS08 has no effect on economic growth in Malaysia. Dummy variables added to the model to capture the effects of global financial crisis on the economy fail to get any significant effects. In fact, the Malaysia economy was not being affected by the global financial crisis in the 2008. The Malaysian banking system was less affected from the mortgage crisis due to the domestic banks have strengthened and built significant buffers after the Asian financial crisis. The stock market indices examined are important both in the short-run and in the long-run. The evidence support the existence of stock market, banks and real estate are important to the Malaysian economy. In line with the study by Ang (2008), the high demand in the economic activity has led to the increase in financial services. It is believed that financial intermediation and financial development are a good predictor to identify the long-run economic growth and also important for the growth process (Levine and Renelt, 1992; King and Levine, 1993b).

Table 5.4b (i): PECM of Real GDP with Stock Market Indices for Malaysia with Crisis 1997 and 2008

Dependent variable is ΔY_{gdp}
Sample 1990:1 – 2016:4

KLSE		**BNK**		**RES**	
Regressor	Coefficient	Regressor	Coefficient	Regressor	Coefficient
INT	.28381	INT	.83609[a]	INT	.54699[b]
ΔY_{t-1}	.14536	ΔY_{t-2}	-.40671[a]	ΔY_{t-1}	.020165
ΔY_{t-2}	-.41029[a]	ΔY_{t-3}	-.29273[a]	ΔY_{t-2}	-.64775[a]
ΔY_{t-4}	.10625	ΔY_{t-4}	.10196	ΔY_{t-3}	-.19986[b]
ΔY_{t-5}	-.1635[b]	ΔY_{t-5}	-.25808[a]	ΔY_{t-5}	-.32084[a]
$\Delta KLCI_{t-2}$	.072918[a]	ΔBNK_{t-2}	.080261[a]	ΔRES_{t-3}	.020075
$\Delta KLCI_{t-3}$	.070276[a]	ΔBNK_{t-3}	.059910[a]	ΔRES_{t-5}	.033830[b]
Δm_{t-1}	-.37964[b]	ΔBNK_{t-5}	.012901	Δm_{t-1}	.39725[b]
Δm_{t-2}	.20329	Δm_{t-1}	.52492[a]	Δm_{t-2}	.40871[b]
Δr_{t-4}	.012714[b]	Δm_{t-5}	.26263	Δm_{t-5}	.23323
Δp_{t-2}	-1.1999[a]	Δr_{t-3}	-.013910[b]	Δr_{t-3}	-.0087892
Δp_{t-4}	-1.0631[b]	Δr_{t-4}	-.013544[b]	Δr_{t-4}	.0097005
Δp_{t-5}	.61382	Δr_{t-5}	-.011659[b]	Δr_{t-5}	-.011092[c]
Δe_{t-2}	-.034841[c]	Δp_{t-2}	-.94694[b]	Δp_{t-2}	-.74739[c]
Δe_{t-4}	-.046879[b]	Δp_{t-4}	-.38719	Δp_{t-4}	-1.3578[a]
CRISIS97	-.030562[b]	Δe_{t-1}	-.018292	Δe_{t-2}	-.035462[c]
CRISIS08	-.0035894	Δe_{t-2}	-.031168[c]	CRISIS97	-.019950
SR1	-.014391[a]	CRISIS97	-.0083100	CRISIS08	-.0069255
SR2	.011908[c]	CRISIS08	-.0053583	ECT_{t-1}	-.066974[a]
ECT_{t-1}	-.053631[a]	SR1	-.012040[b]	ECT_{t-2}	-.018055
ECT_{t-2}	.012930	SR2	.018192[a]		
		ECT_{t-1}	-.033003[c]		
		ECT_{t-2}	-.056677[a]		
R^2	.72827	R^2	.76769	R^2	.68769
AIC	227.9501	AIC	233.5052	AIC	221.8505
F-stat. F(20,81)	10.8547[.000]	F-stat. F(22, 78)	11.7162[.000]	F-stat. F(19,82)	9.5031[.000]
χ^2_{SC}[4]	.32402[.988]	χ^2_{SC}[4]	5.9837[.200]	χ^2_{SC}[4]	7.4822[.112]
χ^2_{FF}[1]	3.1773[.075]	χ^2_{FF}[1]	2.4952[.114]	χ^2_{FF}[1]	13.7809[.000]
χ^2_{N}[2]	1.1454[.564]	χ^2_{N}[2]	3.4637[.177]	χ^2_{N}[2]	.087398[.957]
χ^2_{H}[1]	.0079101[.929]	χ^2_{H}[1]	.53172[.466]	χ^2_{H}[1]	.32353[.569]

Table 5.4b (ii): PECM of Real GDP with Stock Market Indices for Malaysia with Crisis 1997

Dependent variable is ΔY_{gdp}
Sample 1990:1 – 2016:4

KLSE		**BNK**		**RES**	
Regressor	Coefficient	Regressor	Coefficient	Regressor	Coefficient
INT	.037258	INT	.57997 [a]	INT	.19932
ΔY_{t-1}	.25260 [b]	ΔY_{t-2}	-.49889 [a]	ΔY_{t-1}	.22029 [b]
ΔY_{t-2}	.32226 [a]	ΔY_{t-3}	-.17611 [b]	ΔY_{t-2}	.47593 [a]
ΔY_{t-3}	.14903	ΔY_{t-4}	.042299	ΔY_{t-4}	.22137 [b]
ΔY_{t-4}	.30108 [a]	ΔBNK_{t-2}	.080805 [a]	ΔY_{t-5}	.33098 [a]
ΔY_{t-5}	.28250 [a]	ΔBNK_{t-3}	.094259 [a]	ΔRES_{t-2}	.013566
$\Delta KLCI_{t-2}$	.095125 [a]	ΔBNK_{t-4}	.028260	ΔRES_{t-3}	.020646
$\Delta KLCI_{t-3}$	.028564	Δm_{t-1}	.32198 [c]	ΔRES_{t-5}	.037308 [a]
$\Delta KLCI_{t-7}$	.028224	Δm_{t-3}	.084038	Δm_{t-1}	.32080 [c]
Δm_{t-1}	.25782	Δr_{t-1}	-.010656 [c]	Δm_{t-2}	.41101 [b]
Δm_{t-2}	.52627 [b]	Δr_{t-3}	-.010293 [c]	Δm_{t-5}	.26636
Δm_{t-3}	.29458	Δp_{t-1}	-.75335 [c]	Δr_{t-4}	-.016736 [a]
Δm_{t-4}	.32189	Δp_{t-2}	-1.4019 [a]	Δr_{t-5}	-.013257 [b]
Δm_{t-6}	.34287 [c]	Δp_{t-4}	-1.0598 [a]	Δr_{t-6}	.0065570
Δm_{t-7}	.24765	Δe_{t-2}	-.046293 [c]	Δp_{t-2}	-1.1510 [a]
Δr_{t-1}	-.0061980	Δe_{t-4}	-.019937	Δp_{t-4}	-.94090 [b]
Δr_{t-4}	-.029183 [a]	CRISIS97	-.0052968	Δp_{t-5}	.60154
Δr_{t-5}	-.022218 [a]	SR1	-.015544 [a]	Δp_{t-6}	-1.2083 [a]
Δr_{t-6}	.0094585	SR2	.022735 [a]	Δe_{t-2}	-.038258 [b]
Δp_{t-2}	-.95244 [b]	ECT_{t-1}	-.046278 [c]	Δe_{t-3}	-.026270
Δp_{t-4}	-.72605 [c]	ECT_{t-2}	-.055430	Δe_{t-4}	.030877
Δp_{t-6}	-1.3352 [a]			CRISIS97	-.0041857
Δp_{t-7}	-.67287			SR3	-.0082913 [b]
Δe_{t-1}	.019404			ECT_{t-1}	-.038737 [b]
Δe_{t-2}	-.037612 [b]			ECT_{t-2}	.011637
Δe_{t-4}	-.033528				
Δe_{t-6}	-.025871				
Δe_{t-7}	.020294				
CRISIS97	-.035014 [b]				
SR1	.0091477 [c]				
SR2	.0042304				
ECT_{t-1}	-.036232 [b]				
ECT_{t-2}	.017016				
R^2	.80495	R^2	.72182	R^2	.75880
AIC	229.3101	AIC	229.5201	AIC	229.6087
F-stat. F(32,67)	8.6405[.000]	F-stat. F(20,82)	10.6387[.000]	F-stat. F(24,76)	9.9621[.000]
χ^2_{SC} [4]	7.2648[.123]	χ^2_{SC} [4]	2.8083[.590]	χ^2_{SC} [4]	5.5243[.238]
χ^2_{FF} [1]	6.9386[.008]	χ^2_{FF} [1]	.82948[.362]	χ^2_{FF} [1]	5.2288[.022]
χ^2_{N} [2]	1.4748[.478]	χ^2_{N} [2]	2.2989[.317]	χ^2_{N} [2]	3.3866[.184]
χ^2_{H} [1]	.0060626[.938]	χ^2_{H} [1]	.19547[.658]	χ^2_{H} [1]	.53379[.465]

Table 5.4b (iii): PECM of Real GDP with Stock Market Indices for Malaysia with Crisis 2008

Dependent variable is ΔY_{gdp}
Sample 1990:1 – 2016:4

KLSE		**BNK**		**RES**	
Regressor	Coefficient	Regressor	Coefficient	Regressor	Coefficient
INT	.60546 [b]	INT	.38000 [a]	INT	.018483
ΔY_{t-1}	.10608	ΔY_{t-2}	-.46986 [a]	ΔY_{t-1}	.20243 [b]
ΔY_{t-2}	-.46577 [a]	ΔY_{t-3}	-.14961 [c]	ΔY_{t-2}	-.57154 [a]
ΔY_{t-3}	-.10811	Y_{t-4}	.070455	ΔY_{t-3}	-.084737
ΔY_{t-4}	.087992	$DBNK_{t-2}$	.086729 [a]	ΔY_{t-5}	-.22060 [b]
ΔY_{t-5}	-.21992 [b]	ΔBNK_{t-3}	.10158 [a]	ΔRES_{t-3}	.018601
$\Delta KLCI_{t-2}$	.067861 [b]	ΔBNK_{t-4}	.031806	ΔRES_{t-5}	.034539 [b]
$\Delta KLCI_{t-3}$	.052322 [c]	Δm_{t-1}	.35929 [c]	Δm_{t-2}	.34475 [c]
$\Delta KLCI_{t-4}$	-.012048	Δm_{t-2}	.15081	Δm_{t-4}	.13439
Δm_{t-1}	.36390 [c]	Δm_{t-3}	-.13449	Δr_{t-1}	-.0038979
Δm_{t-2}	.14922	Δr_{t-1}	.0095892	Δr_{t-5}	-.011247 [b]
Δm_{t-3}	-.067112	Δr_{t-3}	-.012237 [b]	Δp_{t-1}	.46143
Δm_{t-5}	-.17673	Δr_{t-4}	.0079413	Δp_{t-2}	-.83213 [b]
Δr_{t-2}	-.0098404 [c]	Δp_{t-1}	.54229	Δp_{t-4}	-1.1790 [a]
Δr_{t-4}	.0078860	Δ_{t-2}	-1.5173 [a]	Δp_{t-5}	.59117
Δr_{t-5}	-.0096972	Δp_{t-4}	-1.1190 [a]	Δe_{t-1}	-.021446
Δp_{t-1}	.29675	Δe_{t-3}	-.029545 [b]	Δe_{t-2}	-.054066 [a]
Δp_{t-2}	-1.0499 [b]	CRISIS08	-.0057546	Δe_{t-5}	-.020196
Δp_{t-3}	.33252	SR1	-.014506 [a]	CRISIS08	-.0018774
Δp_{t-4}	-1.1789 [a]	SR2	.019905 [a]	SR1	-.014704 [a]
Δp_{t-5}	.47068	ECT_{t-1}	-.064433 [b]	SR2	.010050
Δe_{t-2}	-.034353 [c]	ECT_{t-2}	-.041301 [b]	ECT_{t-1}	-.011224
Δe_{t-5}	-.010016			ECT_{t-2}	-.033836 [c]
CRISIS08	-.0021161				
SR1	-.013167 [b]				
SR2	.011292 [c]				
ECT_{t-1}	-.062480 [a]				
ECT_{t-2}	.029243				
R^2	.74603	R^2	.72783	R^2	.74842
AIC	224.3968	AIC	229.6452	AIC	226.5860
F-stat. F(27,74)	8.0509[.000]	F-stat. F(21,81)	10.3148[.000]	F-stat. F(22,77)	10.4122[.000]
χ^2_{SC}[4]	1.0936[.895]	χ^2_{SC}[4]	1.9778[.740]	χ^2_{SC}[4]	3.4822[.481]
χ^2_{FF}[1]	3.4903[.062]	χ^2_{FF}[1]	1.1550[.283]	χ^2_{FF}[1]	2.5288[.112]
χ^2_{N}[2]	.31816[.853]	χ^2_{N}[2]	2.0780[.354]	χ^2_{N}[2]	1.2939[.524]
χ^2_{H}[1]	.12290[.726]	χ^2_{H}[1]	.0033301[.954]	χ^2_{H}[1]	.81364[.367]

5.4.3 Philippines

Table 5.4c(i) represents the results of the Philippines stock market indices with crisis 1997 and 2008 for the sample period spans from 1990Q1 to 2016Q4. Dummy variables CRISIS97 and CRISIS08 added to the model to capture the effects of the Asian financial crisis 1997 and global financial crisis in 2008. The effect of both crises on the economy failed to get any significant effects in all models. The Philippines is not spared from being affected by the massive financial crisis in 1997 and 2008. The Philippines central bank had intervened heavily to defend peso since July 1997. Compared to Indonesia, Malaysia and Thailand, the Philippines' capital market is more restricted. Furthermore, the less rapid capital market liberalization had protected its economy from huge foreign borrowing and external debt. The floating exchange rate regime adopted in 1970 to some extent insulates the economy from the external shock. This supports the fact that the Philippines economy is less affected by the both crises and less vulnerable to the shock. From the stock market equation, there is evidence of positive correlation of stock market in the short-run. Instead, economic growth is positively correlated with the stock market. The error correction coefficient is significant and negative. This implies that past level of stock market is related to economic growth, where economic growth reacts by closing 3.5 percent of the gap to return to its long-run equilibrium relationship. Exchange rate has negative effects on the economic growth. It suggests that the appreciation in the peso exchange drives economic growth higher at quarter one. There is strong evidence on the role of bank in the case of the Philippines. Bank is not neutral, it affects economic growth in both the short-run and the long-run. The estimated elasticity of economic growth with respect to bank is 0.04 which reflects a 0.04 percent increase in economic growth from a 1 percent rise in bank. Economic growth adjusts by 2.4 percent to the disequilibrium in the long-run relationship. Interest rate has small effect on economic growth. Interestingly, the

estimated inflation coefficient is the largest compared to other monetary variables. This indicates that inflation has more real effects on growth than other nominal variables. A 1 percent increases in the inflation causes economic growth to grow by an approximately 0.56 percent. Similarly with stock market and bank findings, the real estate is also important to the economic growth. The coefficient of economic growth with respect to real estate is positive and significant which explain that real estate has positive effect on economic growth. The short-run response of economic growth to the long-run disequilibrium in the explanatory variables in the system is 2.5 percent (0.025). The effect of interest rate is very small and has negative sign. Inflation and exchange rate effect economic growth significantly. Inflation is important and has greater effects than any other variables included in the equation. Evidence from real estate equation supports the role of exchange rate cannot be rejected.

The estimation results of economic growth of stock market indices with separating crisis 1997 and crisis 2008 are reported in Table 5.4c(ii) and Table 5.4c(iii). The result with crisis 1997 and 2008 reveals that the Philippines are not affected by the 1997 Asian financial crisis and 2008 global crisis. The dummy crisis added to the model to capture the effect of crises 1997 and 2008 on the economy fail to get any significant effect. As reported by the International Monetary Fund (IMF), during the eve of Asian financial crisis, the Philippine economy was forecast to grow at more than 6 percent in 1998. When the crisis hit in the second half of 1997, the forecasts exhibited less downward for the Philippines than other Asian countries. The Philippines economy contraction was considerably less severe than those experienced by its neighbors. The Philippines did not experience global economic recession, but it suffered a slowdown in economic growth. The GDP growth rate in 2008 fell to 4.2 percent, compared to 6.6 percent in 2007 (Table 3.5). However, the slowdown in the Philippine economic growth was not due to the global financial crisis. Rather, the deceleration in the Philippine economy was

largely brought about by a surge in inflation triggered by the sharp rise in food and fuel prices.

The evidence from Philippines shows that all the sectoral indices significant in both the short-run and the long-run. Investigating each of the equations reveals more information on the sectoral indices. The finding suggests that in the short-run, economic growth is more responsive to bank than stock market and real estate when take consideration of both crises into the model. This is because the Philippines banking sector has shown strong growth in the face of slowing global demand, moderate inflation and an improved standard of the banking sector's asset quality, which has prevented overheating of domestic asset markets. The banking sector has also been undergoing a considerable structural transformation including the removal of restrictions on the degree of foreign bank ownership. It seems to suggest the modernization in the banking sector had increased the access to financial services and accelerates the growth in the economy (Levine, 1997; Demirguc-Kunt and Levine, 2009; Cihak et al., 2013).

Table 5.4c (i): PECM of Real GDP with Stock Market Indices in Philippines with Crisis 1997 and 2008

Dependent variable is ΔY_{gdp}
Sample 1990:1 – 2016:4

PSEI		**BNK**		**RES**	
Regressor	Coefficient	Regressor	Coefficient	Regressor	Coefficient
INT	.19879 [a]	INT	.0055761	INT	.35091 [b]
ΔY_{t-1}	-.33812 [a]	ΔY_{t-3}	-.085891 [a]	ΔY_{t-1}	-.48294 [a]
ΔY_{t-2}	-.25144 [a]	ΔY_{t-4}	.90988 [a]	ΔY_{t-2}	-.24514 [a]
ΔY_{t-3}	-.31363 [a]	ΔBNK_{t-1}	.049692 [a]	ΔY_{t-3}	-.38964 [a]
ΔY_{t-4}	.45361 [a]	ΔBNK_{t-3}	.022490 [c]	ΔY_{t-4}	.45593 [a]
$\Delta PSEI_{t-1}$	.033668 [a]	Δm_{t-3}	.073855 [c]	ΔRES_{t-2}	.014060
$\Delta PSEI_{t-2}$	.018458 [c]	Δr_{t-2}	-.024037 [b]	ΔRES_{t-3}	.024945 [b]
$\Delta PSEI_{t-3}$	.033984 [a]	Δr_{t-4}	-.016948	ΔRES_{t-4}	.017175 [c]
$\Delta PSEI_{t-4}$	.016005 [c]	Δp_{t-1}	-.39338 [b]	Δm_{t-2}	.10250 [b]
Δm_{t-2}	.074673 [c]	Δp_{t-4}	-.56105 [a]	Δr_{t-2}	-.012093
Δr_{t-2}	-.028653 [a]	Δe_{t-1}	-.099514 [b]	Δr_{t-4}	-.026177 [b]
Δr_{t-4}	-.030932 [a]	Δe_{t-2}	-.081457 [b]	Δp_{t-1}	-.87782 [a]
Δp_{t-1}	-.79401 [a]	CRISIS97	.0018434	Δp_{t-3}	.23766
Δp_{t-3}	.18687	CRISIS08	-.0093325	Δp_{t-4}	-.24061
Δp_{t-4}	-.18904	ECT_{t-1}	-.024084 [b]	Δe_{t-1}	-.062756 [c]
Δe_{t-1}	-.098297 [b]	ECT_{t-2}	.0092124	Δe_{t-3}	-.039069
Δe_{t-3}	-.036437			SR2	-.022259 [b]
CRISIS97	-.0026022			SR3	.017812
CRISIS08	-.0051615			CRISIS97	-.0047477
SR1	-.021405 [b]			CRISIS08	-.0051241
ECT_{t-1}	-.035880 [b]			ECT_{t-1}	-.025512 [c]
				ECT_{t-2}	-.016074
R^2	.98603	R^2	.98327	R^2	.98506
AIC	289.5435	AIC	283.2648	AIC	285.0652
F-stat. F(20,82)	9.4148[.000]	F-stat. F(15,87)	8.9300[.000]	F-stat. F(21,81)	11.2380[.000]
χ^2_{SC} [4]	3.2943[.510]	χ^2_{SC} [4]	6.4891[.165]	χ^2_{SC} [4]	6.9675[.138]
χ^2_{FF} [1]	.46302[.496]	χ^2_{FF} [1]	1.2589[.262]	χ^2_{FF} [1]	1.2153[.270]
χ^2_{N} [2]	6.0094[.050]	χ^2_{N} [2]	4.1860[.123]	χ^2_{N} [2]	.96058[.619]
χ^2_{H} [1]	.053200[.818]	χ^2_{H} [1]	.10803[.742]	χ^2_{H} [1]	.25679[.612]

Table 5.4c (ii): PECM of Real GDP with Stock Market Indices in Philippines with Crisis 1997

Dependent variable is ΔY_{gdp}
Sample 1990:1 – 2016:4

PSEI		**BNK**		**RES**	
Regressor	Coefficient	Regressor	Coefficient	Regressor	Coefficient
INT	.20414 [a]	INT	.33778 [c]	INT	.34416 [a]
ΔY_{t-1}	.33800 [a]	ΔY_{t-3}	-.12775 [a]	ΔY_{t-1}	-.37379 [a]
ΔY_{t-2}	.25164 [a]	ΔY_{t-4}	.59101 [a]	ΔY_{t-2}	-.25699 [a]
ΔY_{t-3}	.31514 [a]	ΔY_{t-5}	-.15785 [a]	ΔY_{t-3}	-.31525 [a]
ΔY_{t-4}	.44873 [a]	ΔBNK_{t-1}	.023171 [b]	ΔY_{t-4}	.41441 [a]
$\Delta PSEI_{t-1}$	.035795 [a]	ΔBNK_{t-7}	.017736	ΔRES_{t-3}	.026262 [a]
$\Delta PSEI_{t-2}$	.020240 [b]	Δm_{t-1}	.051600	ΔRES_{t-4}	.012789
$\Delta PSEI_{t-3}$	.035108 [a]	Δm_{t-2}	.10006 [b]	Δm_{t-2}	.091036 [b]
$\Delta PSEI_{t-4}$	.016254 [c]	Δm_{t-3}	.077566 [c]	Δr_{t-2}	-.012117
Δm_{t-2}	.071648 [c]	Δr_{t-5}	.030808 [a]	Δr_{t-4}	-.028444 [a]
Δr_{t-2}	-.027954 [a]	Δr_{t-6}	.015420 [c]	Δp_{t-1}	-.63795 [a]
Δr_{t-4}	-.030143 [a]	Δr_{t-7}	.024649 [b]	Δe_{t-1}	-.056964 [c]
Δp_{t-1}	-.77423 [a]	Δp_{t-1}	-.57016 [a]	Δe_{t-4}	-.031661
Δp_{t-3}	.17843	Δp_{t-2}	-.43734 [b]	CRISIS97	-.0012244
Δp_{t-4}	-.17544	Δp_{t-4}	-.50857 [a]	SR1	-.027289 [a]
Δe_{t-1}	-.10345 [a]	Δp_{t-6}	-.22526	ECT_{t-1}	-.022358 [b]
Δe_{t-3}	-.033296	Δe_{t-2}	-.040389	ECT_{t-2}	-.025113 [b]
CRISIS97	-.0021758	Δe_{t-3}	-.069632 [b]		
SR1	-.021897 [b]	Δe_{t-4}	-.073701 [b]		
ECT_{t-1}	-.036689 [b]	Δe_{t-5}	-.053242		
		Δe_{t-6}	-.078669 [b]		
		Δe_{t-7}	-.068040 [c]		
		SR1	-.030278 [a]		
		CRISIS97	-.0055491		
		ECT_{t-1}	.0010852		
		ECT_{t-2}	-.014977 [c]		
R^2	.98592	R^2	.98768	R^2	.98437
AIC	290.1186	AIC	281.4592	AIC	287.7704
F-stat. F(19,83)	5.7926[.000]	F-stat. F(25,74)	7.2276[.000]	F-stat. F(16,86)	8.6112[.000]
χ^2_{SC} [4]	3.9520[.413]	χ^2_{SC} [4]	5.2242[.265]	χ^2_{SC} [4]	7.4479[.114]
χ^2_{FF} [1]	.77990[.377]	χ^2_{FF} [1]	.12645[.722]	χ^2_{FF} [1]	.67805[.410]
χ^2_{N} [2]	3.8012[.149]	χ^2_{N} [2]	4.6309[.099]	χ^2_{N} [2]	3.1132[.211]
χ^2_{H} [1]	.0023709[.961]	χ^2_{H} [1]	.22490[.635]	χ^2_{H} [1]	.44819[.503]

Table 5.4c (iii): PECM of Real GDP with Stock Market Indices in Philippines with Crisis 2008

Dependent variable is ΔY_{gdp}
Sample 1990:1 – 2016:4

PSEI		**BNK**		**RES**	
Regressor	Coefficient	Regressor	Coefficient	Regressor	Coefficient
INT	.26736[b]	INT	.22185[b]	INT	.22718
ΔY_{t-1}	-.42012[a]	ΔY_{t-1}	-.077690	ΔY_{t-1}	-.41491[a]
ΔY_{t-2}	-.27443[a]	ΔY_{t-2}	-.28844[a]	ΔY_{t-2}	-.21793[b]
ΔY_{t-3}	-.32329[a]	ΔY_{t-3}	-.37010[a]	ΔY_{t-3}	-.37041[a]
ΔY_{t-4}	.51221[a]	ΔY_{t-4}	.42526[a]	ΔY_{t-4}	.44520[a]
$\Delta PSEI_{t-1}$	.033029[a]	ΔY_{t-5}	-.31186[a]	ΔRES_{t-1}	.017179
$\Delta PSEI_{t-2}$	.021822[b]	ΔBNK_{t-1}	.019849[c]	ΔRES_{t-2}	.015814
$\Delta PSEI_{t-3}$	.031282[a]	ΔBNK_{t-3}	.024437[b]	ΔRES_{t-3}	.027303[b]
$\Delta PSEI_{t-4}$	.017504[c]	ΔBNK_{t-7}	.022781[b]	ΔRES_{t-4}	.022034[b]
Δm_{t-1}	.077599[c]	Δm_{t-2}	.067844[c]	Δm_{t-1}	.030681
Δm_{t-3}	.084979[b]	Δm_{t-3}	.052530	Δm_{t-2}	.081307[c]
Δr_{t-2}	-.022597[b]	Δr_{t-5}	.026900[a]	Δr_{t-2}	-.015210
Δr_{t-4}	-.025309[b]	Δr_{t-6}	-.017281[c]	Δr_{t-4}	-.028211[a]
Δp_{t-1}	.83179[a]	Δr_{t-7}	.018827[b]	Δp_{t-1}	-.78290[a]
Δp_{t-3}	.19396	Δp_{t-1}	.63240[a]	Δp_{t-3}	.21324
Δp_{t-4}	-.30357[c]	Δp_{t-4}	-.35025[b]	Δp_{t-4}	-.28351
Δe_{t-1}	.10305[a]	Δe_{t-2}	-.030404	Δe_{t-1}	-.088492[b]
Δe_{t-3}	-.047299	Δe_{t-5}	-.075558[b]	Δe_{t-3}	-.030451
CRISIS08	-.0047477	Δe_{t-6}	.095025[b]	Δe_{t-4}	.047730
SR2	-.012107	CRISIS08	-.0018607	CRISIS08	-.0014640
ECT_{t-1}	-.030558[b]	SR1	-.021532[b]	SR1	-.013971
		ECT_{t-1}	.0071958	SR2	-.014261
		ECT_{t-2}	-.019398[b]	SR3	.016377
				ECT_{t-1}	-.022228
				ECT_{t-2}	-.022572[c]
R^2	.98540	R^2	.98817	R^2	.98564
AIC	287.2646	AIC	286.5207	AIC	284.1134
F-stat. F(20,82)	6.7100[.000]	F-stat. F(22,77)	9.4602[.000]	F-stat. F(24,78)	12.0424[.000]
χ^2_{SC}[4]	6.6109[.158]	χ^2_{SC}[4]	1.1659[.884]	χ^2_{SC}[4]	7.2323[.124]
χ^2_{FF}[1]	2.5140[.113]	χ^2_{FF}[1]	1.8196[.177]	χ^2_{FF}[1]	.97338[.324]
χ^2_{N}[2]	3.2373[.198]	χ^2_{N}[2]	4.2456[.120]	χ^2_{N}[2]	2.9298[.231]
χ^2_{H}[1]	.6707E-4[.993]	χ^2_{H}[1]	.5895E-3[.981]	χ^2_{H}[1]	.003941[.950]

5.4.4 Singapore

Singapore has become a major financial center of international repute and its economy is more advanced than any of its neighboring region. With a well-developed financial system, good legal and regulatory enforcement, the economy is less affected by the global financial crisis in 2008. As such, dummy crisis CRISIS08 applied on the equations failed to retrieve any significant results. However, only the crisis dummy of CRISIS97 that represents Asian financial crisis in 1997 is significant and has a negative sign. The crisis that occurs in 1997Q2 to 1999Q4 had an effect only on real estate equation. The results are reported in Table 5.4d (i). The comparison of analysis with Asian financial crisis in Table 5.4d (ii) and without Asian financial crisis in Table 5.4d (iii) reveal interesting findings. The findings are summarized in subsequent paragraphs.

As seen from Table 5.4d (i), there is strong evidence on the role of stock market in the case of Singapore. Stock market is not neutral, it affects economic growth in both the short-run and the long-run. The estimated elasticity of economic growth with respect to stock market is 0.03 which reflects a 0.03 percent increase in economic growth from a 1 percent rise in stock market. Economic growth adjusts by 5.9 percent to the disequilibrium in the long-run relationship. Interest rate coefficient 0.017 is significant and very small than other nominal variables. This is because with highly free capital movement in Singapore, interest rate is heavily influenced by the movement of foreign interest rate and, hence has limited role on the economic growth. Moreover, the economy is largely denominated by foreign firms and mainly financed from foreign source. Interest rate is not used as a policy tool to affect economic growth. Interestingly, the estimated inflation coefficient is the largest compared to the other two indices. This indicates that inflation has more real effects on economic growth than other nominal variables. As 1 percent increase in inflation cause the economic growth to grow by an approximately 1.03 percent. There is a close link between exchange rate and economic

growth. The coefficient of exchange rate is very significant. Economic growth expands by 0.13 percent when exchange rate appreciates by 1 percent. This suggests that an appreciation of the currency keeps inflationary pressures, restrains wage pressures and expands the economy. This is particularly important in a country like Singapore which is at risk of overheating due to its high import contents in its production. As such, exchange rate has been used as the main monetary policy tool to control inflation in Singapore. Similarly with the result of stock market, bank and real estate has a significant effect on economic growth. From the bank equation, the error correction coefficient explains that economic growth correct by 4.6 percent of divergence of the long-run steady-state relationship. Inflation and exchange rate effect economic growth significantly. Exchange rate is significant at quarter five. A 1 percent appreciation in Singapore dollar expands the economy by 0.10 percent. The coefficient of CRISIS97 and CRISIS08 as a proxy for the effects of Asian and global financial crisis is negative but not significant. This indicates the economy is not vulnerable to the financial shock. Evidence from real estate equation reveals that real estate returns effect economic growth in the short-run. Economic growth expanded by 0.03 percent from 1 percent expansion in the real estate. From the long-run relationship of the series, economic growth adjusts by 9.4 percent to clear the disequilibrium in the system. The dummy crisis is run to measure the shocks of the Asian and global financial crisis against Singapore's economy. Interestingly, only dummy CRISIS97 is significant and has a negative sign. The crisis that took place in 1997 had a huge effect on economic activity through the property market. This finding is consistent with the study by Tan (2001) that the Singapore property market showed weak growth in 1997. The property price index in Singapore fell about 35 percent in 1997. Uncertainty in currencies, stocks and property has affected the economy directly through increased non-performing loans (NPL). The increases in NPLs led banks to tighten credit by raising interest rate spread

and lowering loan deposit ratios, which further weakened the domestic demand and contributed to the recession.

Table 5.4d (ii) represents the results of Singapore stock market index with crisis97. As can be seen from the stock market equation, economic growth is positively correlated with the stock market and shows the expected sign. Likewise for the money supply, interest rate, inflation and exchange rates show the same sign as expected. The coefficient of error correction term show the speed of adjustment of economic growth towards the long-run equilibrium level is 7.5 percent. From the bank's equation, economic growth is positively correlated with the banks. The percentage increase in bank will increase economic growth by 0.03 percent in the short-run. Referring to error correction coefficient, economic growth adjusts by closing 7.7 percent of the instability in the system by moving towards a steady state economy. In addition, CRISIS97 coefficient as a proxy for the effect of the Asian financial crisis is negative and not significant for all estimated models. This indicates that the CRISIS97 fail to get any significant effects in stock market, bank and real estate equations. The estimation of economic growth with real estate shows there is strong evidence on the role of real estate in the case of Singapore. The real estate is not neutral, and it affects economic growth in the short-run. The estimated elasticity of economic growth with respect to real estate is 0.039 which indicates that increases of 1 percent in the real estate increase the economic growth by 0.03 percent. Economic growth adjusts to bring about the long-run equilibrium by closing 6.6 percent of the gap. Interestingly, all the variables are significant and follow the expected sign.

Estimation of Singapore stock market indices with crisis 2008 are reported in Table 5.4d (iii). The estimation of economic growth with Singapore stock exchange shows that the return in stock market has a positive effect on economic growth. The variable of broad money, interest rate, inflation and exchange rate are significant and carries the

expected sign, which indicates that all variables have a significant effect on economic growth in the short-run. The speed of adjustment to the long-run equilibrium level is shown by ECT. The coefficient of ECT is negative and significant which is indicates economic growth adjusts to bring about the long-run equilibrium by closing 8.6 percent of the gap. The estimation of economic growth with banks shows that the coefficient of bank is positive and significant at four-quarter lag with the elasticity in the range of 0.027. The adjustment coefficient is 9.2 percent. The negative and significant ECT indicates that economic growth adjusts to clear the disequilibrium to the long-run equilibrium through the 9.2 percent speed of adjustment. Similarly with stock market and bank findings, the real estate is also important to the economic growth. The coefficient of the error correction term is negative and significant, indicates that economic growth adjusts to bring about the long-run equilibrium by closing 8.3 percent of the gap. The coefficient of the real estate index at quarter lag one is positive and significant which indicates that a 1 percent increase in stock market would increase economic growth by 0.025 percent. The findings from PECM estimation for stock market, bank and real estate with crisis 2008 clearly support CRISIS08 has no effect on economic growth in Singapore. Dummy variables added to the model to capture the effects of global financial crisis on the economy fail to get any significant effects. The Singapore financial system has suffered some initial pressure but has proven to be resilient during the crisis. Banks and insurers maintained robust capital and liquidity buffers and the balance sheets are relatively strong. In fact, the prudent risk management allowed the financial sector to weather the crisis well.

Table 5.4d (i): PECM of Real GDP with Stock Market Indices in Singapore with Crisis 1997 and 2008

Dependent variable is ΔY_{gdp}
Sample 1990:1 – 2016:4

STI		**BNK**		**RES**	
Regressor	Coefficient	Regressor	Coefficient	Regressor	Coefficient
INT	.10674[a]	INT	1.1801[a]	INT	1.7859[a]
ΔY_{t-1}	-.014880	ΔY_{t-4}	-.10624	ΔY_{t-1}	-.11764
ΔY_{t-4}	-.10485	ΔBNK_{t-1}	.022920	ΔY_{t-3}	-.088082
ΔSTI_{t-2}	.023859	ΔBNK_{t-4}	.036654[b]	ΔY_{t-4}	-.19960[b]
ΔSTI_{t-3}	.039704[c]	Δm_{t-1}	.35046[a]	ΔY_{t-5}	-.12138
ΔSTI_{t-5}	.017457	Δm_{t-3}	.12270	ΔY_{t-6}	-.18810[b]
Δm_{t-1}	.37581[a]	Δm_{t-4}	.29431[b]	ΔY_{t-7}	.11379
Δm_{t-3}	.19045	Δr_{t-1}	-.011865[a]	ΔRES_{t-4}	.033601[b]
Δm_{t-4}	.47261[a]	Δr_{t-2}	-.0078066[c]	ΔRES_{t-5}	.021584
Δm_{t-5}	.16324	Δr_{t-4}	-.018870[a]	ΔRES_{t-7}	.036006[a]
Δr_{t-1}	-.015143[a]	Δr_{t-5}	-.010977[a]	Δm_{t-2}	.19145
Δr_{t-2}	-.012416[a]	Δp_{t-1}	-.54441	Δm_{t-4}	.24043[c]
Δr_{t-4}	-.017464[a]	Δp_{t-2}	-.78937[b]	Δr_{t-1}	-.013463[a]
Δr_{t-5}	-.0067605[c]	Δp_{t-5}	-.41937	Δr_{t-2}	-.013118[a]
Δp_{t-1}	-.92483[b]	Δe_{t-1}	.047246	Δr_{t-4}	-.019849[a]
Δp_{t-2}	-1.0322[b]	Δe_{t-5}	-.10219[b]	Δr_{t-5}	-.0078340[b]
Δp_{t-5}	-.48965	Δe_{t-6}	-.067386	Δr_{t-6}	-.0049475
Δe_{t-2}	-.086755	CRISIS97	-.0042761	Δp_{t-2}	-.36019
Δe_{t-3}	-.098016[c]	CRISIS08	-.0074124	Δp_{t-6}	-.58036[c]
Δe_{t-4}	-.070399	ECT_{t-1}	.056227[a]	Δe_{t-1}	-.18360[a]
Δe_{t-5}	-.13224[b]	ECT_{t-2}	-.046185[a]	Δe_{t-5}	-.085665[c]
CRISIS97	-.012184			Δe_{t-6}	-.068354
CRISIS08	-.012366			CRISIS97	-.013810[c]
SR1	-.0020955			CRISIS08	-.0026814
ECT_{t-1}	-.059644[a]			ECT_{t-1}	-.094128[a]
ECT_{t-2}	.050259[a]			ECT_{t-2}	.030789[a]
R^2	.60382	R^2	.61789	R^2	.61779
AIC	259.0459	AIC	262.6691	AIC	254.4147
F-stat. F(25,76)	4.6333[.000]	F-stat. F(20,80)	6.4681[.000]	F-stat. F(25,74)	4.7843[.000]
$\chi^2_{SC}[4]$	3.5066[.477]	$\chi^2_{SC}[4]$	1.8063[.771]	$\chi^2_{SC}[4]$	2.8749[.579]
$\chi^2_{FF}[1]$	2.3913[.122]	$\chi^2_{FF}[1]$	9.2138[.002]	$\chi^2_{FF}[1]$	7.6514[.006]
$\chi^2_{N}[2]$	.77968[.677]	$\chi^2_{N}[2]$	.22709[.893]	$\chi^2_{N}[2]$	.46110[.794]
$\chi^2_{H}[1]$	.14087[.707]	$\chi^2_{H}[1]$	.99462[.319]	$\chi^2_{H}[1]$	2.6413[.104]

Table 5.4d (ii): PECM of Real GDP with Stock Market Indices in Singapore with Crisis 1997

Dependent variable is ΔY_{gdp}
Sample 1990:1 – 2016:4

STI			**BNK**			**RES**		
Regressor		Coefficient	Regressor		Coefficient	Regressor		Coefficient
INT		.77913[a]	INT		1.3608[a]	INT		.52484[b]
ΔY_{t-1}		-.12134	ΔY_{t-1}		-.018841	ΔY_{t-1}		-.081764
ΔY_{t-4}		.20735[b]	ΔY_{t-4}		-.10454	ΔY_{t-2}		-.065842
ΔY_{t-5}		-.10197	ΔY_{t-5}		-.11679	ΔY_{t-3}		-.011602
ΔSTI_{t-1}		.046432[b]	ΔBNK_{t-1}		.030444[c]	ΔY_{t-4}		-.14692
ΔSTI_{t-2}		.032022[c]	ΔBNK_{t-4}		.030041[c]	ΔRES_{t-1}		.039906[b]
ΔSTI_{t-6}		.028954[c]	Δm_{t-1}		.19451	ΔRES_{t-2}		.023032
Δm_{t-4}		.33958[a]	Δm_{t-4}		.26443[b]	Δm_{t-1}		.21916
Δm_{t-5}		.33985[a]	Δm_{t-5}		.23148[c]	Δm_{t-3}		.24243[c]
Δr_{t-1}		-.014444[a]	Δr_{t-1}		-.016851[a]	Δm_{t-4}		.44195[a]
Δr_{t-2}		-.017311[a]	Δr_{t-2}		-.013538[a]	Δm_{t-5}		.26553[c]
Δr_{t-3}		-.014431[a]	Δr_{t-3}		-.0096613[b]	Δr_{t-1}		-.013514[a]
Δr_{t-4}		-.020676[a]	Δr_{t-4}		-.020585[a]	Δr_{t-2}		-.014195[a]
Δr_{t-5}		-.018164[a]	Δr_{t-5}		-.015918[a]	Δr_{t-3}		-.0081551[c]
Δp_{t-1}		-.64701[c]	Δr_{t-6}		.0063884	Δr_{t-4}		-.012057[a]
Δp_{t-2}		-.60126	Δp_{t-1}		-.46623	Δr_{t-5}		-.0052756
Δp_{t-5}		-.43041	Δp_{t-2}		-.74619[b]	Δp_{t-1}		-.88715[b]
Δp_{t-6}		-.53424	Δp_{t-3}		-.42385	Δp_{t-2}		-.82509[b]
Δe_{t-3}		-.12503[a]	Δp_{t-6}		-.42539	Δp_{t-5}		-.53765
$\Delta e(_{t-4}$		-.11946[b]	Δe_{t-3}		-.057263	Δe_{t-3}		-.12317[b]
Δe_{t-5}		-.20316[a]	Δe_{t-4}		-.069340	Δe_{t-4}		-.067563
Δe_{t-6}		-.094680[c]	Δe_{t-5}		-.13405[b]	Δe_{t-5}		-.10362[c]
CRISIS97		-.0013394	Δe_{t-6}		-.088588[c]	CRISIS97		-.010159
SR1		-.0034129	CRISIS97		-.0042424	SR1		-.0031080
ECT_{t-1}		.075604[a]	SR1		-.0019095	ECT_{t-1}		-.066464[a]
ECT_{t-2}		-.059337[a]	ECT_{t-1}		.077896[a]	ECT_{t-2}		-.045576[a]
			ECT_{t-2}		-.065818[a]			
R^2		.67206	R^2		.64798	R^2		.60079
AIC		265.3894	AIC		260.8122	AIC		247.6571
F-stat.	F(25,75)	6.1479[.000]	F-stat.	F(26,74)	5.2391[.000]	F-stat.	F(25,65)	2.7173[.000]
χ^2_{SC}[4]		3.8734[.423]	χ^2_{SC}[4]		.59754[.963]	χ^2_{SC}[4]		3.0571[.548]
χ^2_{FF}[1]		6.6772[.010]	χ^2_{FF}[1]		9.2375[.002]	χ^2_{FF}[1]		.75131[.386]
χ^2_{N}[2]		.44102[.802]	χ^2_{N}[2]		.080977[.960]	χ^2_{N}[2]		2.0498[.359]
χ^2_{H}[1]		1.6954[.193]	χ^2_{H}[1]		1.0379[.308]	χ^2_{H}[1]		1.5280[.216]

Table 5.4d (iii): PECM of Real GDP with Stock Market Indices in Singapore with Crisis 2008

Dependent variable is ΔY_{gdp}
Sample 1990:1 – 2016:4

STI		**BNK**		**RES**	
Regressor	Coefficient	Regressor	Coefficient	Regressor	Coefficient
INT	.35913 [a]	INT	.96496 [a]	INT	.066050
ΔY_{t-1}	-.063958	ΔY_{t-4}	-.17314 [c]	ΔY_{t-1}	-.053264
ΔY_{t-3}	-.085161	ΔY_{t-5}	-.017879	ΔY_{t-4}	-.18918 [c]
ΔY_{t-4}	-.16476 [c]	ΔBNK_{t-1}	.017358	ΔRES_{t-1}	.025050 [c]
ΔY_{t-5}	-.10823	ΔBNK_{t-3}	.022313	ΔRES_{t-3}	.022654
ΔSTI_{t-5}	.017399	ΔBNK_{t-4}	.027609 [c]	Δm_{t-1}	.29857 [b]
ΔSTI_{t-6}	.032806 [c]	Δm_{t-1}	.42658 [a]	Δm_{t-3}	.28998 [b]
Δm_{t-4}	.39512 [a]	Δm_{t-3}	.20113	Δm_{t-4}	.47263 [a]
Δm_{t-5}	.35072 [a]	Δm_{t-4}	.40258 [a]	Δm_{t-5}	.23139 [c]
Δr_{t-1}	-.016795 [a]	Δm_{t-5}	.15070	Δr_{t-1}	-.014611 [a]
Δr_{t-2}	-.017077 [a]	Δr_{t-1}	-.010665 [a]	Δr_{t-2}	-.014333 [a]
Δr_{t-3}	-.012836 [a]	Δr_{t-2}	-.0091496 [b]	Δr_{t-3}	-.0058295
Δr_{t-4}	-.023356 [a]	Δr_{t-4}	-.017138 [a]	Δr_{t-4}	-.013444 [a]
Δr_{t-5}	-.017944 [a]	Δr_{t-5}	-.0080016 [b]	Δr_{t-5}	-.0049918
Δr_{t-6}	-.0059374	Δp_{t-1}	-.70565 [c]	Δp_{t-1}	-.65410 [c]
Δp_{t-1}	-.65416 [c]	Δp_{t-2}	-.69209 [c]	Δp_{t-2}	-.62138
Δp_{t-2}	-.84773 [b]	Δp_{t-5}	-.58926 [c]	Δp_{t-5}	-.47398
Δp_{t-6}	-.66599 [b]	Δe_{t-1}	-.11523 [c]	Δe_{t-2}	-.057728
Δe_{t-2}	-.088174 [c]	Δe_{t-2}	-.064297	Δe_{t-3}	-.12767 [b]
Δe_{t-3}	-.12857 [a]	Δe_{t-5}	-.11425 [c]	Δe_{t-4}	-.066859
Δe_{t-4}	-.16822 [a]	SR1	-.0025880	Δe_{t-5}	-.099581 [c]
Δe_{t-5}	-.18258 [a]	CRISIS08	-.011845	CRISIS08	-.011433
Δe_{t-6}	-.11133 [b]	ECT_{t-1}	-.092917 [a]	SR1	-.0032974
CRISIS08	-.0055223	ECT_{t-2}	-.0063472	ECT_{t-1}	-.083562 [a]
ECT_{t-1}	-.086288 [a]			ECT_{t-2}	-.0035086
ECT_{t-2}	.058383 [a]				
R^2	.64835	R^2	.60529	R^2	.60115
AIC	261.8654	AIC	261.2352	AIC	259.7034
F-stat. F(25,75)	5.5313[.000]	F-stat. F(23,78)	5.2006[.000]	F-stat. F(24,77)	4.8357[.000]
χ^2_{SC} [4]	4.4866[.344]	χ^2_{SC} [4]	1.2805[.865]	χ^2_{SC} [4]	1.5327[.821]
χ^2_{FF} [1]	9.6234[.002]	χ^2_{FF} [1]	2.0105[.156]	χ^2_{FF} [1]	.025534[.873]
χ^2_{N} [2]	1.8468[.397]	χ^2_{N} [2]	.57611[.750]	χ^2_{N} [2]	.78565[.675]
χ^2_{H} [1]	2.1895[.139]	χ^2_{H} [1]	.45713[.499]	χ^2_{H} [1]	.58474[.444]

5.4.5 Thailand

Table 5.4e (i) represents the PECM with crisis 1997 and 2008 in Thailand for sample period covering from 1990Q1 to 2016Q4. These models are reinforced with some dummies to measure the financial crisis and outliers. CRISIS97 and CRISIS08 were used to measure the effect of the Asian and global financial crisis on the Thai economy. The shocks of the Asian financial crisis were measured in the second quarter of 1997 to the fourth quarter of 1999, while for the global financial crisis the shock was measured in the third quarter of 2007 to the second quarter of 2009. However, only the crisis dummy of CRISIS97 that represents Asian financial crisis is significant and has a negative sign. The crisis that took place in 1997 had a huge effect on the stock market in Thailand. The market capitalization recorded drastic drop during the 1997 Asian financial crisis. In the first quarter of 1996, the market capitalization was at 3,665.2 billion baht. Then, it decreased further to the lowest point at 898.6 billion baht in the third quarter of 1998. Over the period 1993-2007, the market also witnessed wide swings in its market index especially during the Asian financial crisis.

Findings from Table 5.4e(i) for the stock market equation shows there is an evidence of positive correlation of Thai stock exchange (SET) in the short-run. The coefficient of stock market is significant and even greater than banks and real estate index. Economic growth expands by 0.032 percent from 1 percent expansion in the stock market. From the long-run relationship of the series, economic growth adjust by 5.8 percent to clear the disequilibrium in the system. From the bank equation, this analysis confirms that the bank has significant effect on the economic activity in Thailand. The coefficient of bank is 0.031 and statistically significant at lag two. The establishment of Bangkok International Banking Facilities (BIBFs) in 1993 has made easier access to international financial markets and facilitates external borrowing. It allows commercial banks to operate businesses including deposit acceptance, loan

extension and other financial services in non-baht currency. The significant and negative sign in the error correction coefficient suggests that bank has some effects on economic growth in the long-run. About 6.4 percent of the long-run disequilibrium is eliminated by economic growth in that period. All the monetary variables (broad money, interest rate, inflation and exchange rate) are important and it has an effect on economic growth significantly. Similarly, the findings support real estate is important in Thailand. The real estate has an effect on economic growth in the short-run. The coefficient of real estate has a right sign and it is statistically significant. Referring to this error correction coefficient, economic growth adjusts by closing 9.8 percent of the disequilibrium in the system moving towards the steady state economy. The effect of interest rate is very small, significant and has right sign. Inflation is important and has greater effects than any other variables included in the equation. Evidence from real estate equation supports the role of exchange rate cannot be rejected.

The findings for Thailand stock market indices with crisis 1997 reported in Table 5.4e (ii) reveals that the dummy variables added to capture the effects of Asian financial crisis on the economy fail to get any significant results for all estimated models. From the stock market equation, economic growth is positively correlated with the stock market and shows the expected sign. Likewise for the money supply, interest rate, inflation and exchange rates show the same sign as expected. The coefficient of error correction term show the speed of adjustment of economic growth towards the long-run equilibrium level is 5.5 percent. From the bank's equation, economic growth is positively correlated with the banks. The percentage increase in bank will increase economic growth by 0.02 percent in the short-run. Referring to error correction coefficient, the economic growth adjusts by closing 4.0 percent of the instability in the system by moving towards a steady state economy. The estimation of economic growth with real estate shows there is strong evidence on the role of real estate in the case of

Thailand. The real estate is not neutral, and it affects economic growth in the short-run. The estimated elasticity of economic growth with respect to real estate is 0.019 which indicates that increases of 1 percent in the real estate increase the economic growth by 0.019 percent. Economic growth adjusts to bring about the long-run equilibrium by closing 3.8 percent of the gap. Interestingly, all the variables are significant and follow the expected sign.

Findings from Table 5.4e(iii) for the stock market indices with crisis 2008 shows there is an evidence of positive correlation of Thai stock exchange in the short-run. The response of economic growth to changes in stock market is significant and has positive sign. The error correction coefficient is negative and significant which indicates that economic growth adjusts by 5.9 percent to push back the economy towards equilibrium. Similarly, the findings support bank is important in Thailand. Bank effects economic growth in the short-run as well as in the long-run. The elasticity of economic growth with respect to banks is 0.034. A 1 percent increases in bank increases economic growth by 0.034 percent. From the long-run effect of bank, the economic growth moves to eliminate the discrepancy between the short-run and the long-run equilibrium by 4.1 percent (0.041). The findings show that interest rate, inflation and exchange rate are significant and carries expected sign. The real estate also has an effect on economic growth in the short-run. Referring to this error correction coefficient, economic growth adjusts by closing 5.0 percent of the disequilibrium in the system moving towards the steady state economy. The effect of interest rate is very small and significant. Inflation is important and has greater effects than any other variables included in the equation. Evidence from real estate equation supports the role of exchange rate cannot be rejected. Consistent with the findings in Table 5.4e (i), dummy variables added to the model to capture the effects of global financial crisis (CRISIS08) on the economy fail to get any significant effects.

Table 5.4e (i): PECM of Real GDP with Stock Market Indices in Thailand with Crisis 1997 and 2008

Dependent variable is ΔY_{gdp}
Sample 1990:1 – 2016:4

SET		**BNK**		**RES**	
Regressor	Coefficient	Regressor	Coefficient	Regressor	Coefficient
INT	.064610	INT	-1.9363 [a]	INT	-.92133 [b]
ΔY_{t-1}	-.27313 [a]	ΔY_{t-1}	-.72744 [a]	ΔY_{t-1}	-.34143 [b]
ΔY_{t-2}	-.13775	ΔY_{t-2}	-.49479 [a]	ΔY_{t-2}	-.32792 [b]
ΔY_{t-6}	.19437 [b]	ΔY_{t-3}	-.22240 [b]	ΔY_{t-3}	-.23715 [c]
ΔSET_{t-3}	.032023 [c]	ΔY_{t-4}	-.16839 [c]	ΔY_{t-4}	-.13332
ΔSET_{t-4}	.016455	ΔY_{t-6}	.12069	ΔY_{t-8}	-.18092 [c]
ΔSET_{t-7}	.0098291	ΔY_{t-8}	-.19064 [b]	ΔRES_{t-1}	.023771 [b]
Δm_{t-1}	.73293 [a]	ΔBNK_{t-2}	.031197 [a]	ΔRES_{t-3}	.030164 [b]
Δm_{t-5}	.46883 [b]	ΔBNK_{t-4}	.0092493	ΔRES_{t-4}	.018259 [c]
Δm_{t-6}	.66772 [a]	ΔBNK_{t-8}	.0075032	ΔRES_{t-5}	.022813 [b]
Δr_{t-1}	-.0019789	Δm_{t-1}	.84375 [a]	ΔRES_{t-7}	.012047
Δr_{t-5}	-.0055409 [a]	Δm_{t-2}	.44872 [b]	Δm_{t-1}	1.0324 [a]
Δp_{t-2}	-.91708 [a]	Δm_{t-5}	.60431 [a]	Δm_{t-2}	.72594 [a]
Δp_{t-3}	-.80631 [b]	Δm_{t-6}	.93688 [a]	Δm_{t-5}	.65310 [a]
Δp_{t-4}	-.83029 [b]	Δm_{t-7}	.73478 [a]	Δm_{t-6}	1.0255 [a]
Δp_{t-5}	-.99090 [a]	Δr_{t-1}	-.0038564 [b]	Δm_{t-7}	.72313 [a]
Δp_{t-7}	-.66640 [b]	Δr_{t-3}	-.0032684 [c]	Δr_{t-1}	.0027059
Δe_{t-1}	-.17514 [a]	Δr_{t-5}	-.0044178 [a]	Δr_{t-3}	-.0044266 [c]
Δe_{t-2}	-.11810 [c]	Δr_{t-8}	-.0059274 [a]	Δr_{t-4}	-.0028792
Δe_{t-3}	-.21175 [a]	Δp_{t-2}	-.56084 [c]	Δr_{t-5}	.0026918
Δe_{t-6}	-.10205	Δp_{t-3}	-.81561 [a]	Δr_{t-6}	.0026731
CRISIS97	-.021681 [c]	Δp_{t-4}	-.91437 [a]	Δr_{t-8}	-.0058175 [a]
CRISIS08	-.0026676	Δp_{t-5}	-.68418 [b]	Δp_{t-2}	-.55991
SR1	-.0089548 [c]	Δp_{t-7}	-.37722	Δp_{t-3}	-.96052 [a]
SR2	-.011614 [b]	Δe_{t-1}	-.10739	Δp_{t-4}	-1.2544 [a]
SR3	.012709 [b]	Δe_{t-2}	-.13771 [c]	Δp_{t-5}	-1.1157 [a]
ECT_{t-1}	-.052812 [a]	Δe_{t-3}	-.076559	Δp_{t-7}	-.72023 [b]
ECT_{t-2}	-.058885 [a]	Δe_{t-4}	.14818 [b]	Δp_{t-8}	-.69831 [c]
		Δe_{t-8}	.072953	Δe_{t-1}	-.23868 [a]
		CRISIS97	-.013444	Δe_{t-2}	-.39222 [a]
		CRISIS08	-.0028668	Δe_{t-3}	-.23376 [a]
		SR2	-.015238 [a]	Δe_{t-5}	-.19358 [b]
		ECT_{t-1}	-.064797 [a]	Δe_{t-7}	-.11794
		ECT_{t-2}	.068409 [a]	Δe_{t-8}	.10159
				CRISIS97	-.013529
				CRISIS08	-.0054912
				ECT_{t-1}	-.098441 [a]
				ECT_{t-2}	-.047362 [a]
R^2	.69725	R^2	.64632	R^2	.60143
AIC	237.6679	AIC	244.0793	AIC	233.1643
F-Stat. F(27,74)	2.9276[.000]	F-Stat. F(33,65)	3.5995[.000]	F-Stat. F(37,60)	2.3826[.001]
χ^2_{SC}[4]	6.4670[.167]	χ^2_{SC}[4]	4.4099[.353]	χ^2_{SC}[4]	4.5936[.332]
χ^2_{FF}[1]	.13323[.715]	χ^2_{FF}[1]	2.3106[.128]	χ^2_{FF}[1]	.95268[.329]
χ^2_{N}[2]	21.0507[.000]	χ^2_{N}[2]	4.1708[.124]	χ^2_{N}[2]	17.9628[.000]
χ^2_{H}[1]	.80517[.370]	χ^2_{H}[1]	2.5317[.112]	χ^2_{H}[1]	1.3076[.253]

Table 5.4e (ii): PECM of Real GDP with Stock Market Indices in Thailand with Crisis 1997

Dependent variable is ΔY_{gdp}
Sample 1990:1 – 2016:4

SET		**BNK**		**RES**	
Regressor	Coefficient	Regressor	Coefficient	Regressor	Coefficient
INT	.49828 [a]	INT	-.61602 [b]	INT	.34224 [b]
ΔY_{t-1}	-.28244 [b]	ΔY_{t-1}	-.31267 [a]	ΔY_{t-1}	-.26706 [b]
ΔY_{t-2}	-.098775	ΔY_{t-2}	-.073969	ΔY_{t-2}	-.12994
ΔY_{t-3}	-.11510	ΔY_{t-6}	.21040 [b]	ΔY_{t-3}	-.18882
ΔY_{t-4}	-.15679	ΔY_{t-7}	.053983	ΔY_{t-4}	-.12919
ΔSET_{t-1}	.026514	ΔBNK_{t-2}	.028521 [b]	ΔY_{t-6}	.088293
ΔSET_{t-2}	.022165	ΔBNK_{t-3}	.011226	ΔRES_{t-1}	.019671 [c]
ΔSET_{t-4}	.027083 [c]	Δm_{t-1}	.55371 [a]	ΔRES_{t-2}	.013568
Δm_{t-2}	.21666	Δm_{t-4}	.27570	ΔRES_{t-3}	.018267 [c]
Δm_{t-3}	.36005 [b]	Δm_{t-6}	.45168 [b]	Δm_{t-1}	.51816 [a]
Δm_{t-5}	.18577	Δr_{t-2}	-.0023144	Δm_{t-2}	.24156
Δr_{t-4}	.0032113 [c]	Δr_{t-7}	-.0032408 [b]	Δm_{t-3}	.53507 [b]
Δr_{t-5}	.0039282 [b]	Δp_{t-1}	-.61428 [c]	Δm_{t-6}	.21335
Δp_{t-1}	.62922 [c]	Δp_{t-2}	-.27402	Δr_{t-1}	-.0029476
Δp_{t-2}	-.44507	Δp_{t-3}	-.64589 [b]	Δr_{t-4}	-.0019825
Δp_{t-3}	-.37120	Δp_{t-7}	-.14493	Δr_{t-5}	-.0039500 [b]
Δe_{t-2}	-.047270	Δe_{t-3}	-.056350	Δp_{t-1}	-.75974 [b]
Δe_{t-4}	.051021	Δe_{t-4}	-.11347 [c]	Δp_{t-3}	.37686
Δe_{t-5}	-.11140 [c]	CRISIS97	-.017075	Δp_{t-6}	-.36904
CRISIS97	-.0047335	ECT_{t-1}	.020935 [c]	Δe_{t-4}	-.13662 [b]
ECT_{t-1}	-.055356 [a]	ECT_{t-2}	-.040819 [b]	Δe_{t-5}	.076482
ECT_{t-2}	-.040476 [c]			CRISIS97	-.018969
				SR1	-.0073602
				SR3	.0089760
				ECM1(-1)	.039397 [b]
				ECM2(-1)	-.038244 [b]
R^2	.58415	R^2	.59539	R^2	.60921
AIC	224.1564	AIC	222.4200	AIC	235.1399
F-stat. F(21,78)	1.4925[.080]	F-stat. F(20,79)	1.5329[.069]	F-stat. F (25,61)	2.5701[.001]
χ^2_{SC} [4]	5.4037[.248]	χ^2_{SC} [4]	5.6175[.230]	χ^2_{SC} [4]	7.0129[.135]
χ^2_{FF} [1]	.86373[.353]	χ^2_{FF} [1]	.86031[.354]	χ^2_{FF} [1]	.77921[.377]
χ^2_{N} [2]	40.1886[.000]	χ^2_{N} [2]	39.6136[.000]	χ^2_{N} [2]	13.2049[.001]
χ^2_{H} [1]	.24400[.621]	χ^2_{H} [1]	.39920[.528]	χ^2_{H} [1]	.75028[.386]

Table 5.4e (iii): PECM of Real GDP with Stock Market Indices in Thailand with Crisis 2008

Dependent variable is ΔY_{gdp}
Sample 1990:1 – 2016:4

SET		**BNK**		**RES**	
Regressor	Coefficient	Regressor	Coefficient	Regressor	Coefficient
INT	.45916 [a]	INT	.23599 [c]	C	.13135
ΔY_{t-1}	-.28890 [b]	ΔY_{t-1}	-.36001 [a]	ΔY_{t-1}	-.32093 [a]
ΔY_{t-2}	.15454	ΔY_{t-2}	-.17035	ΔY_{t-2}	-.18763 [c]
ΔY_{t-3}	.22503 [b]	ΔY_{t-3}	-.19410 [c]	ΔY_{t-3}	-.29240 [a]
ΔY_{t-4}	-.17755 [c]	ΔY_{t-4}	-.18330 [c]	ΔY_{t-4}	-.20500 [b]
ΔSET_{t-1}	.033102 [b]	ΔBNK_{t-1}	.026183 [c]	ΔRES_{t-2}	.016598 [c]
ΔSET_{t-2}	.026710 [c]	ΔBNK_{t-2}	.034333 [b]	Δm_{t-1}	.35815 [b]
ΔSET_{t-4}	.017659	ΔBNK_{t-3}	.022813	Δm_{t-3}	.38461 [b]
Δm_{t-1}	.34931 [c]	ΔBNK_{t-4}	.021317	Δr_{t-5}	-.025769 [c]
Δm_{t-2}	.28737 [c]	Δm_{t-1}	.35189 [c]	Δp_{t-1}	-.85249 [a]
Δm_{t-3}	.48651 [b]	Δm_{t-3}	.35680 [c]	Δe_{t-3}	-.068056
Δr_{t-4}	-.0031071 [c]	Δr_{t-4}	-.027335 [c]	Δe_{t-4}	.095262
Δr_{t-5}	-.0030652 [b]	Δp_{t-1}	-.61191 [c]	Δe_{t-5}	-.10147 [c]
Δp_{t-1}	-.64981 [c]	Δp_{t-3}	-.32869	CRISIS08	-.015511
Δp_{t-2}	-.42130	Δe_{t-1}	.043692	SR1	-.0055497
Δe_{t-2}	-.056558	Δe_{t-2}	.039900	SR3	.0055599
Δe_{t-5}	-.10116 [c]	Δe_{t-4}	-.10018 [b]	ECT_{t-1}	-.050864 [a]
CRISIS08	-.011522	CRISIS08	-.0066481	ECT_{t-2}	-.026521 [c]
SR1	-.0086941	SR1	-.0048243		
SR3	.0083126	SR3	.0061292		
ECT_{t-1}	-.059661 [a]	ECT_{t-1}	-.041701 [c]		
ECT_{t-2}	.025521	ECT_{t-2}	.020713		
R^2	.65052	R^2	.60362	R^2	.60818
AIC	256.4418	AIC	260.0198	AIC	253.6104
F-stat. F(21,67)	3.6680[.000]	F-stat. F(21,77)	4.8857[.000]	F-stat. F(17,70)	3.5050[.000]
χ^2_{SC} [4]	5.7720[.217]	χ^2_{SC} [4]	2.3668[.669]	χ^2_{SC} [4]	1.0980[.895]
χ^2_{FF} [1]	2.0219[.155]	χ^2_{FF} [1]	6.0857[.014]	χ^2_{FF} [1]	.48624[.486]
χ^2_{N} [2]	.67402[.714]	χ^2_{N} [2]	.68152[.711]	χ^2_{N} [2]	.58557[.746]
χ^2_{H} [1]	.53974[.463]	χ^2_{H} [1]	.66468[.415]	χ^2_{H} [1]	.75049[.386]

5.5 Granger Causality Test

The Granger causality test is employed to clarify the direction of any existing interactions and to verify the results of cointegration among variables (Granger 1969; 1983). Engle-Granger (1987) states that there is a causal relationship between two cointegrated non-stationary series, in at least one direction. While the cointegrating vectors have been established among the system, causality test are further applied to analyze the dynamic bivariate interactions. The study uses the standard pairwise Granger causality test operated by Eviews 9.0 to inspect the bivariate causal links between economic growth with stock markets indices. The p-value is analyzed at 1, 5 and 10 percent level of significance. If the calculated p-value is greater than the stipulated 1, 5 and 10 percent, then the null hypothesis cannot be rejected (thus, variable does not affect each other). The lag length used for pairwise Granger causality test is selected based on the Akaike information criterion (AIC). The AIC estimate relative distance between the unknown true likelihood function of the data and the fitted likelihood function of the model, therefore by selecting a lower AIC means the model is considered to be closer to the truth.

The result of pair-wise Granger causality for stock market in ASEAN-5 is reported in Table 5.5a. The finding shows that the economic growth does Granger-cause stock market for all countries at 1, 5 and 10 percent significant level. In fact that, there are bidirectional causality form economic growth to stock market for Malaysia and Singapore. The results suggest that stock market indexes play an essential part in explaining the changes in economic growth under the case of Malaysia, Philippines, Singapore and Thailand. For the case of Indonesia, the result of the short-run causality indicates no evidence of bivariate causal links from economic growth to inflation and exchange rate. However, the null hypothesis of Granger non-causality can be rejected from economic growth to stock market and interest rate. It indicates that there exist

causal relationships between economic growth and stock market, and also through economic growth and interest rate. For Malaysia, there is evidence of bidirectional short-run causality running from economic growth to stock market index and broad money. There is also exist unidirectional causality from economic growth to inflation (at 5 percent significance level) and interest rate to economic growth (at 1 percent significance level). For the case of Philippines, the economic growth does not Granger-cause stock market index as the p-value is higher than the 10 percent significant level. The findings found that there are exists three unidirectional Granger-causalities from stock market index to economic growth at 10 percent significance level, broad money to economic growth at 1 percent significance level and exchange rate to economic growth at 5 percent significance level. Interestingly, the findings found similar evidence for the case of Singapore and Thailand. As can see in Table 5.5a, the null hypothesis of Granger non-causality is accepted for one-way directional from stock market to economic growth, economic growth to broad money, economic growth to inflation and interest rate to economic growth at 1 and 5 percent respectively.

Table 5.5b reported the result of pair-wise Granger causality for bank index in ASEAN-5. As represent in Table 5.5b, none of unidirectional causality is found for Thailand and Philippines economic growth to bank index. However, the null hypothesis of Granger non-causality is accepted for unidirectional from bank index to economic growth for all ASEAN-5 countries. It suggests that the previous movements of bank index together with the past values of economic growth can be possibly used to predict the economic growth. Besides, the findings found that the economic growth cause broad money and inflation in Malaysia, Singapore and Thailand. Nevertheless, the null hypothesis of Granger non-causality is accepted for one-way directional from economic growth to exchange rate for all countries. This indicates that there is no causal relationship between economic growth and exchange rate.

The results of the short-run causality for real estate index are presented in Table 5.5c. The finding of economic growth to exchange rate indicates no evidence of short-run causality for all countries. There is however bidirectional short-run Granger causality between economic growth to real estate and broad money for the case of Malaysia. It further indicates bidirectional Granger causality between economic growth and inflation in Thailand. Interestingly, the findings found similar evidence of causality for the case of Malaysia, Singapore and Thailand. The null hypothesis of Granger causality is accepted for unidirectional from real estate to economic growth, economic growth to broad money and economic growth to inflation for these three countries. It indicates that there is evidence of short-run causality between economic growth and broad money, economic growth and inflation, and also, economic growth and real estate. There is also exist unidirectional causality from economic growth to interest rate at 5 and 10 percent significance level for Indonesia and Philippines.

Table 5.5a: Result of Pair-Wise Granger Causality for Stock Market

Countries	Null Hypothesis	F-Stat	Prob.
Indonesia	LIDX does not Granger Cause LY	0.29185	0.5902
	LY does not Granger Cause LIDX	9.34397	0.0028 [a]
	LM does not Granger Cause LY	6.40163	0.0129 [b]
	LY does not Granger Cause LM	1.15123	0.2858
	LR does not Granger Cause LY	1.79627	0.1831
	LY does not Granger Cause LR	3.85728	0.0522 [c]
	LP does not Granger Cause LY	0.25338	0.6158
	LY does not Granger Cause LP	0.26629	0.6069
	LE does not Granger Cause LY	2.25545	0.1362
	LY does not Granger Cause LE	0.75637	0.3865
Malaysia	LKLCI does not Granger Cause LY	3.76057	0.0552 [c]
	LY does not Granger Cause LKLCI	3.50136	0.0641 [c]
	LM does not Granger Cause LY	2.99514	0.0865 [c]
	LY does not Granger Cause LM	13.2976	0.0004 [a]
	LR does not Granger Cause LY	4.02146	0.0475 [b]
	LY does not Granger Cause LR	1.40373	0.2388
	LP does not Granger Cause LY	1.70404	0.1946
	LY does not Granger Cause LP	12.7171	0.0005 [a]
	LE does not Granger Cause LY	0.40133	0.5278
	LY does not Granger Cause LE	1.56818	0.2133
Philippines	LPSEI does not Granger Cause LY	1.87071	0.0756 [c]
	LY does not Granger Cause LPSEI	1.03192	0.3600
	LM does not Granger Cause LY	7.80072	0.0007 [a]
	LY does not Granger Cause LM	0.56709	0.5690
	LR does not Granger Cause LY	2.31144	0.1043
	LY does not Granger Cause LR	1.89553	0.0715
	LP does not Granger Cause LY	1.71833	0.1846
	LY does not Granger Cause LP	1.26688	0.2720
	LE does not Granger Cause LY	3.41162	0.0368 [b]
	LY does not Granger Cause LE	0.78868	0.4572
Singapore	LSTI does not Granger Cause LY	9.84501	0.0022 [a]
	LY does not Granger Cause LSTI	5.75218	0.0182 [b]
	LM does not Granger Cause LY	0.78324	0.3782
	LY does not Granger Cause LM	5.02246	0.0271 [b]
	LR does not Granger Cause LY	5.44883	0.0215 [b]
	LY does not Granger Cause LR	2.29283	0.1330
	LP does not Granger Cause LY	1.17408	0.2811
	LY does not Granger Cause LP	5.10289	0.0260 [b]
	LE does not Granger Cause LY	1.27984	0.2605
	LY does not Granger Cause LE	0.05508	0.8149
Thailand	LSET does not Granger Cause LY	4.50864	0.0133 [b]
	LY does not Granger Cause LSET	1.65125	0.1969
	LM does not Granger Cause LY	1.60618	0.2057
	LY does not Granger Cause LM	9.07570	0.0002 [a]
	LR does not Granger Cause LY	3.52133	0.0332 [b]
	LY does not Granger Cause LR	3.51756	0.0334 [b]
	LP does not Granger Cause LY	1.13918	0.3242
	LY does not Granger Cause LP	3.90707	0.0232 [b]
	LE does not Granger Cause LY	1.93794	0.1493
	LY does not Granger Cause LE	0.82772	0.4400

Notes: a, b and c represents significant level at 1 percent, 5 percent and 10 percent respectively.

Table 5.5 b: Result of Pair-Wise Granger Causality for Bank

Countries	Null Hypothesis	F-Stat	Prob.
Indonesia	LBNK does not Granger Cause LY	2.94417	0.0243 [b]
	LY does not Granger Cause LBNK	2.64214	0.0384 [b]
	LM does not Granger Cause LY	6.40163	0.0129 [b]
	LY does not Granger Cause LM	1.15123	0.2858
	LR does not Granger Cause LY	1.79627	0.1831
	LY does not Granger Cause LR	3.85728	0.0522 [c]
	LP does not Granger Cause LY	0.25338	0.6158
	LY does not Granger Cause LP	0.26629	0.6069
	LE does not Granger Cause LY	2.25545	0.1362
	LY does not Granger Cause LE	0.75637	0.3865
Malaysia	LBNK does not Granger Cause LY	3.94132	0.0225 [b]
	LY does not Granger Cause LBNK	2.74259	0.0692 [c]
	LM does not Granger Cause LY	3.66397	0.0291 [b]
	LY does not Granger Cause LM	7.95271	0.0006 [a]
	LR does not Granger Cause LY	1.96678	0.1452
	LY does not Granger Cause LR	5.57116	0.0051 [a]
	LP does not Granger Cause LY	1.85351	0.1620
	LY does not Granger Cause LP	6.18828	0.0029 [a]
	LE does not Granger Cause LY	1.03445	0.3592
	LY does not Granger Cause LE	0.87195	0.4213
Philippines	LBNK does not Granger Cause LY	2.93826	0.0575 [c]
	LY does not Granger Cause LBNK	2.16233	0.1204
	LM does not Granger Cause LY	7.80072	0.0007 [a]
	LY does not Granger Cause LM	0.56709	0.5690
	LR does not Granger Cause LY	2.31144	0.1043
	LY does not Granger Cause LR	3.91634	0.0055 [a]
	LP does not Granger Cause LY	1.71833	0.1846
	LY does not Granger Cause LP	2.44013	0.0401
	LE does not Granger Cause LY	3.41162	0.0368 [b]
	LY does not Granger Cause LE	0.78868	0.4572
Singapore	LBNK does not Granger Cause LY	8.93210	0.0035 [a]
	LY does not Granger Cause LBNK	6.01560	0.0158 [b]
	LM does not Granger Cause LY	0.78324	0.3782
	LY does not Granger Cause LM	5.02246	0.0271 [b]
	LR does not Granger Cause LY	5.44883	0.0215 [b]
	LY does not Granger Cause LR	2.29283	0.1330
	LP does not Granger Cause LY	1.17408	0.2811
	LY does not Granger Cause LP	5.10289	0.0260 [b]
	LE does not Granger Cause LY	1.27984	0.2605
	LY does not Granger Cause LE	0.05508	0.8149
Thailand	LBNK does not Granger Cause LY	4.00902	0.0097 [a]
	LY does not Granger Cause LBNK	0.85566	0.4669
	LM does not Granger Cause LY	0.97554	0.4076
	LY does not Granger Cause LM	7.46033	0.0002 [a]
	LR does not Granger Cause LY	2.59266	0.0570 [c]
	LY does not Granger Cause LR	2.00920	0.1176
	LP does not Granger Cause LY	2.69197	0.0503 [c]
	LY does not Granger Cause LP	2.82199	0.0428 [b]
	LE does not Granger Cause LY	2.02019	0.1161
	LY does not Granger Cause LE	0.61864	0.6046

Notes: a, b and c represents significant level at 1 percent, 5 percent and 10 percent respectively.

Table 5.5c: Result of Pair-Wise Granger Causality for Real Estate

Countries	Null Hypothesis	F-Stat	Prob.
Indonesia	LRES does not Granger Cause LY	0.00838	0.9273
	LY does not Granger Cause LRES	3.05587	0.0834 [c]
	LM does not Granger Cause LY	6.40163	0.0129 [b]
	LY does not Granger Cause LM	1.15123	0.2858
	LR does not Granger Cause LY	1.79627	0.1831
	LY does not Granger Cause LR	3.85728	0.0522 [b]
	LP does not Granger Cause LY	0.25338	0.6158
	LY does not Granger Cause LP	0.26629	0.6069
	LE does not Granger Cause LY	2.25545	0.1362
	LY does not Granger Cause LE	0.75637	0.3865
Malaysia	LRES does not Granger Cause LY	6.70996	0.0110 [b]
	LY does not Granger Cause LRES	4.52544	0.0358 [b]
	LM does not Granger Cause LY	2.99514	0.0865 [c]
	LY does not Granger Cause LM	13.2976	0.0004 [a]
	LR does not Granger Cause LY	4.02146	0.0475 [b]
	LY does not Granger Cause LR	1.40373	0.2388
	LP does not Granger Cause LY	1.70404	0.1946
	LY does not Granger Cause LP	12.7171	0.0005 [a]
	LE does not Granger Cause LY	0.40133	0.5278
	LY does not Granger Cause LE	1.56818	0.2133
Philippines	LRES does not Granger Cause LY	0.87597	0.3515
	LY does not Granger Cause LRES	4.11047	0.0452 [b]
	LM does not Granger Cause LY	7.80072	0.0007 [a]
	LY does not Granger Cause LM	0.78263	0.3784
	LR does not Granger Cause LY	6.06148	0.0155 [b]
	LY does not Granger Cause LR	3.91634	0.0655 [c]
	LP does not Granger Cause LY	4.91123	0.0405 [b]
	LY does not Granger Cause LP	2.44013	0.1401
	LE does not Granger Cause LY	0.53960	0.4643
	LY does not Granger Cause LE	0.01609	0.8993
Singapore	LRES does not Granger Cause LY	4.28688	0.0409 [b]
	LY does not Granger Cause LRES	1.93936	0.1667
	LM does not Granger Cause LY	0.78324	0.3782
	LY does not Granger Cause LM	5.02246	0.0271 [b]
	LR does not Granger Cause LY	5.44883	0.0215 [b]
	LY does not Granger Cause LR	2.29283	0.1330
	LP does not Granger Cause LY	1.17408	0.2811
	LY does not Granger Cause LP	5.10289	0.0260 [b]
	LE does not Granger Cause LY	1.27984	0.2605
	LY does not Granger Cause LE	0.05508	0.8149
Thailand	LRES does not Granger Cause LY	2.25212	0.0871 [c]
	LY does not Granger Cause LRES	1.50333	0.2185
	LM does not Granger Cause LY	0.97554	0.4076
	LY does not Granger Cause LM	7.46033	0.0002 [a]
	LR does not Granger Cause LY	2.59266	0.0570 [c]
	LY does not Granger Cause LR	2.00920	0.1176
	LP does not Granger Cause LY	2.69197	0.0503 [c]
	LY does not Granger Cause LP	2.82199	0.0428 [b]
	LE does not Granger Cause LY	2.02019	0.1161
	LY does not Granger Cause LE	0.61864	0.6046

Notes: a, b and c represents significant level at 1 percent, 5 percent and 10 percent respectively.

5.6 Impulse Response Functions and Variance Decompositions Analysis

From the finding of cointegration test, this study estimates a level VAR to detect dynamic causal interactions among the variables in the system. The lag order in VAR is selected based on the need of the model to have desirable statistical properties (no serial correlation, normality, homoskedastic variance and correct model specification) rather than using some information theoretic criterion (AIC and SBC). From the estimated VAR, this study generates impulse response functions (IRF) and variance decompositions (VDC) with the following variables' ordering: economic growth, stock market indices, broad money, interest rate, inflation and exchange rate. The IRF is used to discover a temporal response of economic growth to innovations in stock market, bank and real estate. Meanwhile, the VDC allow this study to assess the relative importance of economic growth in accounting for variations in sectoral indices. Figures 5.6a–5.6e plot the impulse response functions while Tables 5.6a–5.6e present corresponding variance decompositions.

5.6.1 Indonesia

Figure 5.6a presents generalized responses of stock market, bank and real estate to shock in economic growth using the sample period from 1990:1 to 2016:4. From Figure 5.6a, the study finds that the economic growth responds positively and significantly to stock market, bank and real estate innovations. The positive response of economic growth to a stock price increase is in line with Teng et al. (2013) and Pradhan et al. (2013) for the case of Asian countries. A positive response of economic growth to stock market suggest that an increase in economic growth may spur equity market. As the economy grows faster, the expansion of stock markets becomes more rapid and extensive (Kim and Lin, 2013). A positive response economic growth to bank shock explains that an increase in economic growth provided more funds for banks to make loans and increase bank deposits. Meanwhile, a positive response of economic growth

to real estate shocks supports the evidence that higher economic growth reflects the future potential of the market, which in turn attracts foreign direct investment and increase property prices (Kim and Yang 2011; Bo and Bo 2007).

Table 5.6a represents the percentage of forecast error variance for economic growth in Indonesia. As the table shows, nearly 49 percent to 99 percent forecast error of shock is explained by its own shock. Among the sectoral indices, shock in economic growth has a larger effect on stock market and its effect remain strong until the period 20. It is evident that stock market explains a larger percentage of variation in economic growth. Moreover, looking at the effect of sectoral indices on economic growth, this finding reveals that the real estate index comes second and about 5.3 percent of the error variance in economic growth is explained by the shock in the real estate sector. Whereas, economic growth is less responsive to the innovation in the banking sector and shows that shock in the bank has less effect on economic growth. The results from IRF seem to be very much consistent with VDC. Economic growth seems to have high positive response to shocks in the stock market as compare to bank and real estate. This further implies that stock market could be a useful forecasting tool for indicating cyclical changes in economic activities.

Table 5.6a: Forecast Error Variance Decomposition for GDP (Y_{gdp}) in Indonesia

Period	ΔY_{gdp}	ΔJKSE	ΔM	ΔR	ΔP	ΔE
1	96.71143	1.222450	1.610026	0.000816	0.010360	0.444918
5	77.61582	7.923468	12.31827	0.440999	0.016912	1.684534
10	63.45014	12.04821	20.84341	2.067680	0.357280	1.233283
20	49.58211	17.60350	22.97708	4.445037	2.163223	3.229049
Period	ΔY_{gdp}	ΔBNK	ΔM	ΔR	ΔP	ΔE
1	99.46283	0.000054	0.460186	0.012617	0.005153	0.059158
5	94.23595	0.000139	5.319365	0.026217	0.167504	0.250828
10	86.40749	0.082511	12.04839	0.446557	0.825198	0.189855
20	73.79416	3.592364	16.69672	2.044467	2.365301	1.506987
Period	ΔY_{gdp}	ΔRES	ΔM	ΔR	ΔP	ΔE
1	99.00225	0.159470	0.691149	0.003053	0.003103	0.140973
5	89.26568	1.117359	8.362447	0.140603	0.039489	1.074422
10	77.50021	1.948613	18.21111	0.693667	0.617249	1.029160
20	63.44948	5.382627	23.86637	1.835621	2.673504	2.792398

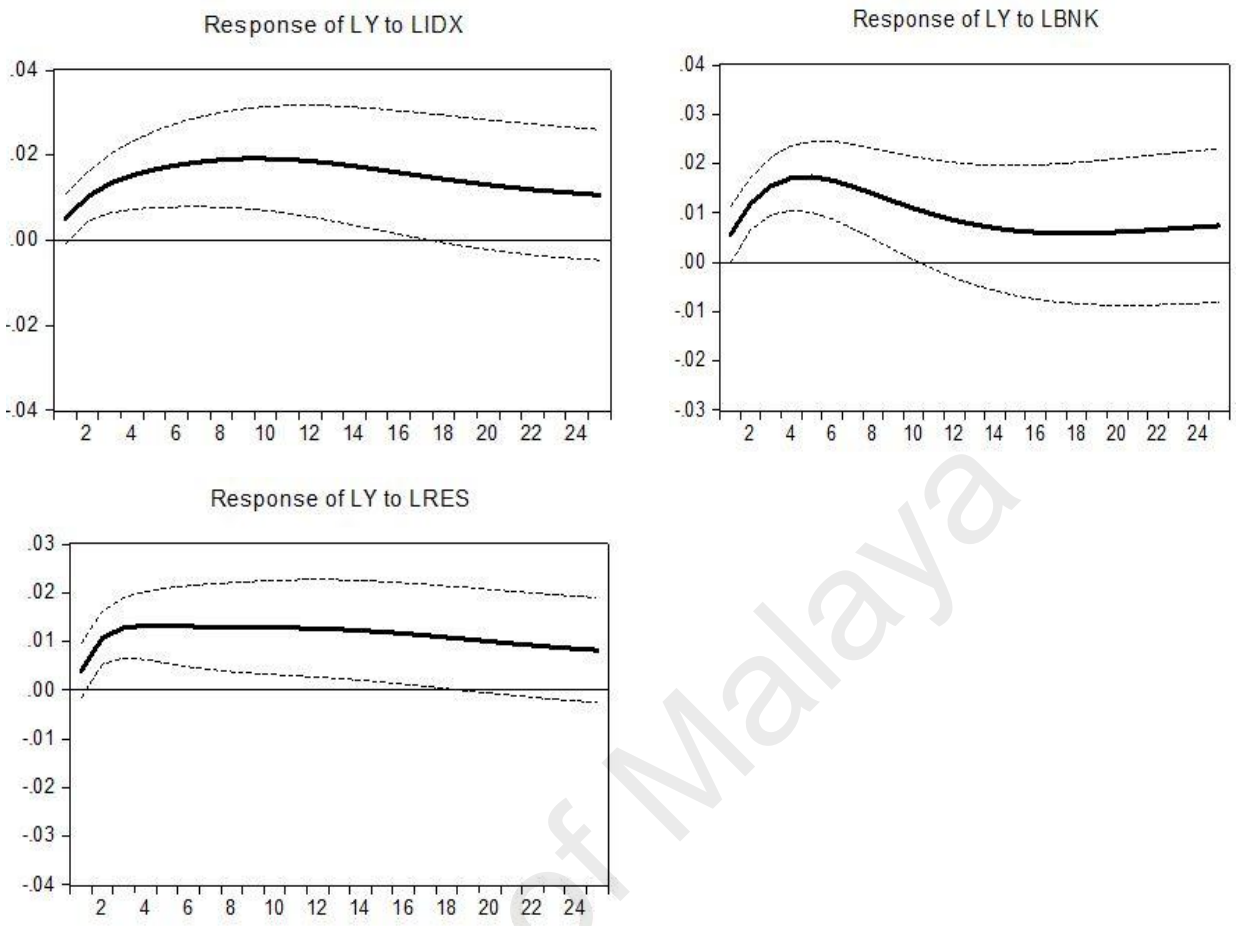


Figure 5.6a: Generalized Responses of GDP (Y_{gdp}) to Stock Indices in Indonesia

5.6.2 Malaysia

From the IRF results, as reported in Figure 5.6b, this study captures the relative importance of shocks in sectoral indices and their influences on the economic growth. The economic growth respond positively and significantly to shocks in the stock market, bank and real estate. The positive response of economic growth to stock market is in line with Mansor (2006) for the case of Malaysia. Similarly, the findings found positive response of economic growth to bank. This finding is consistent with the earlier results of PECM that the effect of bank on economic growth is statistically significant and larger compared to stock market and real estate. This means that, for the case of Malaysia, the banks are the dominant financial institutions in Malaysia. As reported by IMF (2013), the banking sector control most of the financial flows and possess more than 70 percent of the financial system's total assets in Malaysia. The findings suggest that the growth of the economy in Malaysia is closely related to the well-being of the banking sector.

The decomposition of the forecast error variance for economic growth in Malaysia is reported in Table 5.6b. This table represents the variance decomposition results for economic growth at first quarter intervals to 20 quarters. Nearly 52 percent to 92 percent forecast error of shock is explained by its own shock. Shock in the bank has the larger effect on economic growth and the effect remain strong until the period 20 as compared to others indices. The stock market comes second and about 15 percent of the error variance in the economic growth is explained by the shocks in the stock market. Whereas, economic growth is less responsive to the innovation in the real estate sector and the findings reveals that shock in the real estate has less effect on economic growth. Interestingly, the results of VDC show consistent with the findings from IRF and PECM. The error variance in GDP is largely explained by the shock in the bank as compare to others indices. The finding confirms that a well-developed banking sector

stimulate economic growth (Levine, 1997). In fact, increased access to financial services and improved functioning of financial systems accelerates economic growth (Demirguc-Kunt and Levine, 2009; Cihak et al., 2013).

Table 5.6b: Forecast Error Variance Decomposition for GDP (Y_{gdp}) in Malaysia

Period	ΔY_{gdp}	ΔKLSE	ΔM	ΔR	ΔP	ΔE
1	96.21455	0.301673	1.029783	0.783888	0.163098	1.507008
5	71.08120	10.64435	2.570460	11.58732	0.205595	3.911074
10	57.34792	13.92589	3.566668	15.38684	1.770519	8.002162
20	52.44557	15.57207	2.647364	13.67578	5.388900	10.27032
Period	ΔY_{gdp}	ΔBNK	ΔM	ΔR	ΔP	ΔE
1	95.76339	0.272409	1.479625	0.427971	0.358776	1.697831
5	72.72884	11.14557	1.602380	8.349161	0.389031	5.785011
10	57.36336	18.64973	2.235422	12.60103	1.088510	8.061950
20	53.17045	18.30193	1.812575	12.38601	3.899560	10.42947
Period	ΔY_{gdp}	ΔRES	ΔM	ΔR	ΔP	ΔE
1	95.11241	1.616986	1.221733	0.617803	0.497818	0.933252
5	70.61906	10.60311	2.849233	10.52864	0.438700	4.961254
10	56.91745	13.42771	4.900585	14.86537	1.887798	8.001079
20	52.27687	12.95023	4.402230	13.75290	5.681979	10.93578

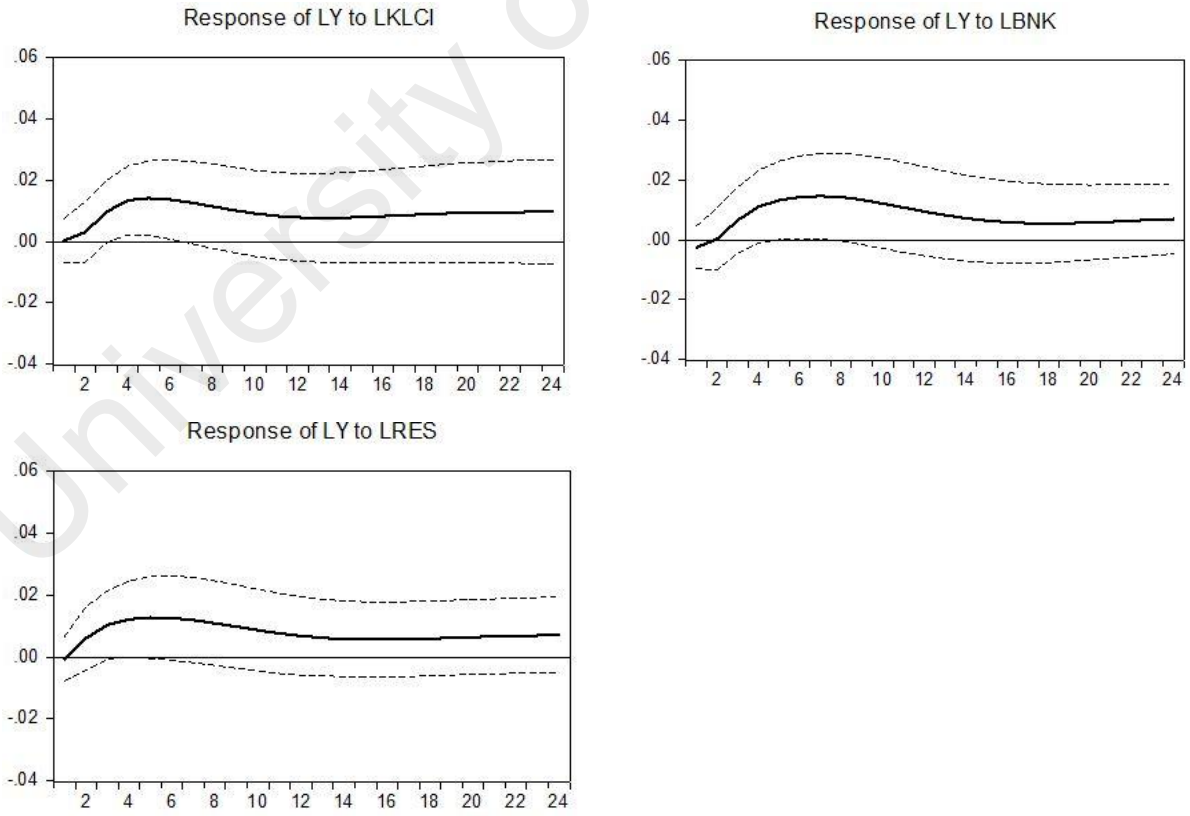


Figure 5.6b: Generalized Responses of GDP (Y_{gdp}) to Stock Indices in Malaysia

5.6.3 Philippines

Figure 5.6c shows the response of economic growth as a result of a one-unit shock to the sectoral indices of stock prices, bank and real estate in Philippines. From the IRF, the study finds that there are positive response of economic growth to innovations in stock market and real estate. Looking at only significant response, the study observes from the Figure 5.1c (i) – 5.1c (iii) (see Appendix B5) that economic growth increase in response to positive shocks in the inflation and broad money. This means that, for the case of Philippines, monetary policy response may act as a good instrument to stabilize and stimulate the economy. Monetary policy is essential to financial stability. By achieving price stability, market distortions and uncertainties arising from inflation are eliminated (Guinigundo, 2011). A plausible explanation is that, for country like Philippines, monetary policy instrument is likely to lead anticipation of further increases and, thus, drive out investment from the stock market. Therefore, changing the monetary policy actions have an important effect on aggregate demand, and thus on both output and prices (Ireland, 2008).

Table 5.6c shows the variance decomposition for economic growth to stock market, banks and real estate. Nearly 75 percent to 95 percent forecast error of shock is explained by its own shock. Among the stock return indices, shock in the stock market has the larger effect on economic growth and the effect remain strong until the period 20. It is evident that the economic growth in the Philippine explains a larger percentage of variation in the stock market. The real estate comes second and about 7.7 percent of the error variance in economic growth is explained by the shock in the real estate. Whereas, economic growth is less responsive to the innovation in the banking sector and implies that shock in the bank has less effect on economic growth.

Table 5.6c: Forecast Error Variance Decomposition for GDP (Y_{gdp}) in Philippines

Period	ΔY_{gdp}	ΔPSEI	ΔM	ΔR	ΔP	ΔE
1	95.79741	0.482202	0.580489	2.758490	0.301837	0.079573
5	87.95537	2.913453	1.856318	4.639773	2.383404	0.251681
10	82.83555	5.642238	1.890700	4.037535	5.277922	0.316060
20	76.42114	8.489226	1.546403	3.275018	9.860288	0.407926
Period	ΔY_{gdp}	ΔBNK	ΔM	ΔR	ΔP	ΔE
1	95.32887	0.130360	1.207651	1.822639	0.406473	1.104012
5	85.89504	0.191504	3.362964	4.517983	2.150592	3.881914
10	81.17647	0.204135	3.633680	4.919729	4.363487	5.702495
20	76.06471	0.301588	3.092775	4.541889	8.163757	7.835280
Period	ΔY_{gdp}	ΔRES	ΔM	ΔR	ΔP	ΔE
1	95.87049	0.499535	0.484195	2.713526	0.329589	0.102660
5	88.02950	2.946564	1.289146	4.658631	2.729455	0.346709
10	82.54283	5.509488	1.191668	4.072619	6.202087	0.481304
20	75.51691	7.724241	1.054113	3.357929	11.61872	0.728083

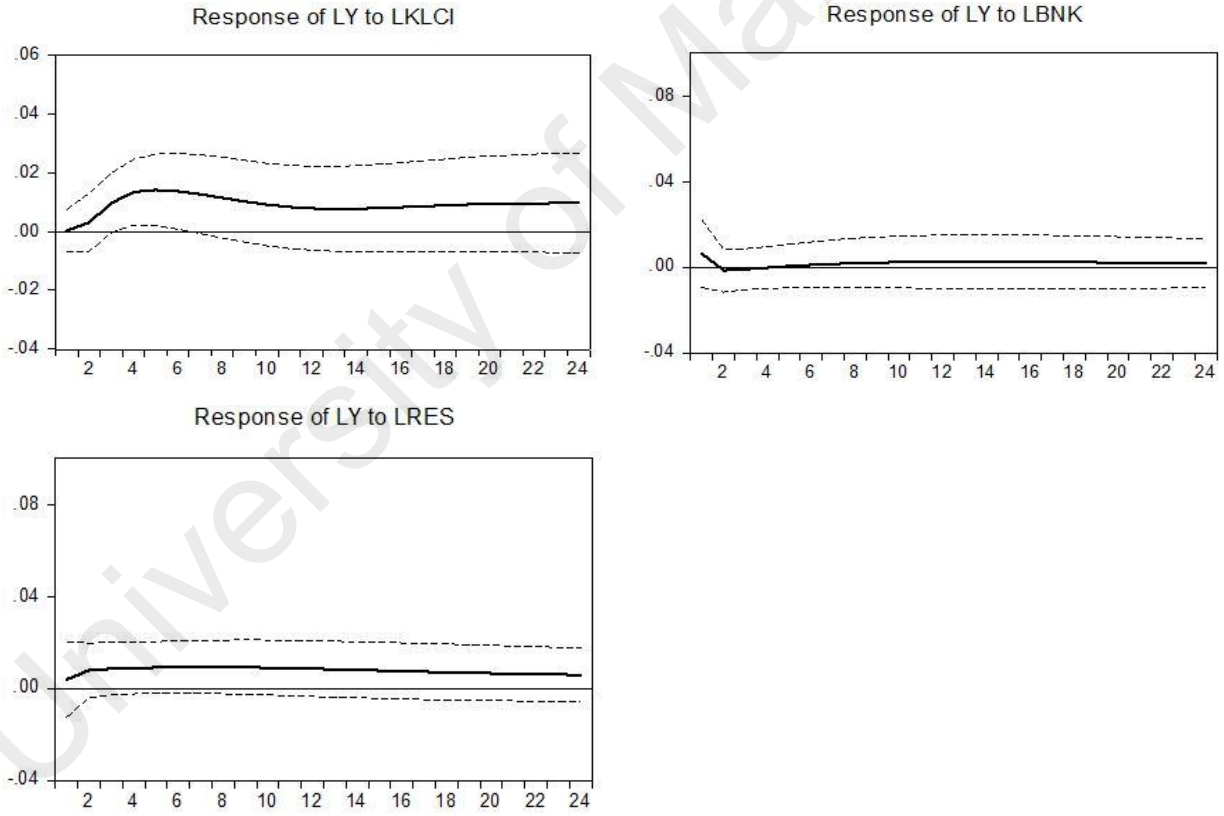


Figure 5.6c: Generalized Responses of GDP (Y_{gdp}) to Stock Indices in Philippines

5.6.4 Singapore

Figure 5.6d represents the impulse response function of economic growth to one standard deviation shock in stock market, bank and real estate in Singapore. The findings show that economic growth responds positively to stock market and real estate, while negative response to bank. The positive response of economic growth to stock market shock suggests that an economy with a well-developed stock market stimulate higher economic growth. Stock markets may spur economic growth through the creation of liquidity. The high liquidity in equity markets make investment less risky and more attractive, and thus improve the allocation of capital and enhances the economic growth. In relation to positive responses of economic growth to real estate, the finding suggests that the real estate plays a key role in supporting economic activities in Singapore. The property price indices for the office and industry sectors increase by 83.5 to 94.6 percent for three consecutive years (1993-1996). The findings supports the evidence that positive economic growth and strong influx of funds into the property market coupled with low interest rates result a buoyant in property market (Deng et al., 2014).

Table 5.6d represents the percentage of forecast error variance of stock market indices in Singapore. The table represents the variance decomposition results for economic growth at first quarter intervals to 20 quarters. As the table shows, nearly 45 percent to 96 percent forecast error of shock is explained by its own shock. Among the stock market indices, shock in the banks has the larger effect on economic growth and the effect remain strong until the period 10. It is evident that the economic growth explains a larger percentage of variation in banking than any other variable in the model. The real estate comes second and about 12.3 percent of the error variance in economic growth is explained by the shock in real estate at the period 10. Whereas, economic growth is less responsive to the innovation in the stock market and implies that shock in the stock market has less effect on economic growth in Singapore.

Table 5.6d: Forecast Error Variance Decomposition for GDP (Y_{gdp}) in Singapore

Period	ΔY_{gdp}	ΔSTI	ΔM	ΔR	ΔP	ΔE
1	96.14862	2.943937	0.470278	0.261514	0.136157	0.039496
5	75.15480	11.70880	7.108352	1.078977	2.708991	2.240083
10	60.27477	10.26198	14.56360	0.853641	7.141083	6.904915
20	53.12753	8.746803	15.49900	2.679968	11.32905	8.617642
Period	ΔY_{gdp}	ΔBNK	ΔM	ΔR	ΔP	ΔE
1	95.44827	3.066991	0.621704	0.093626	0.125738	0.643670
5	69.61881	14.70442	8.111628	0.518811	2.237366	4.808965
10	53.19235	15.29411	17.22411	0.469141	6.076812	7.743488
20	45.81688	12.64294	19.89918	2.952079	10.08232	8.606607
Period	ΔY_{gdp}	ΔRES	ΔM	ΔR	ΔP	ΔE
1	96.11415	2.750738	0.467019	0.511099	0.155526	0.001467
5	76.48110	11.30681	6.501805	1.673840	2.403803	1.632639
10	61.04892	12.34794	13.75221	1.082655	6.002080	5.766193
20	51.19480	14.48675	16.14745	2.084513	9.712852	6.373627

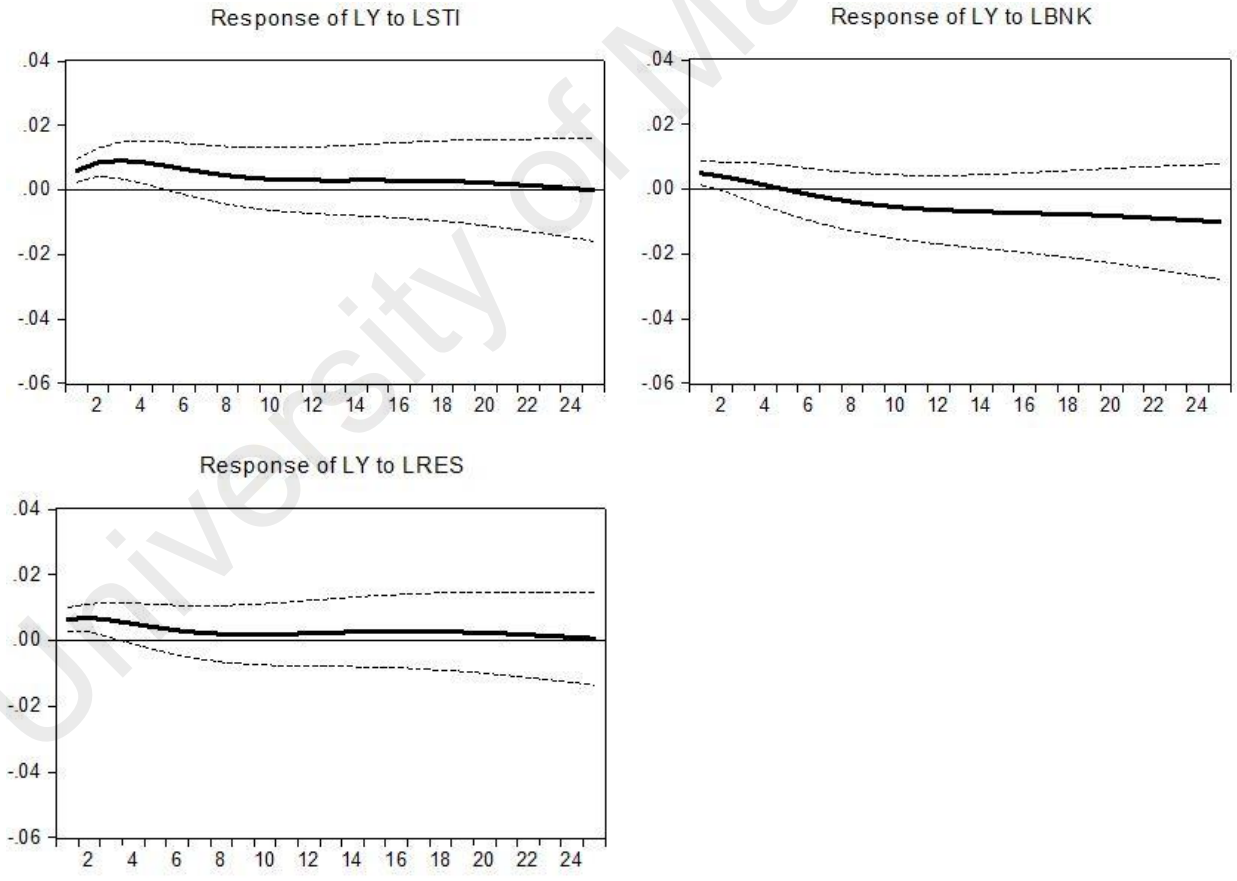


Figure 5.6d: Generalized Responses of GDP (Y_{gdp}) to Stock Indices in Singapore

5.6.5 Thailand

Figure 5.6e represents the response of economic growth to shocks created in the stock market indices of stock market, bank and real estate. The finding show that a shock generated in stock market indices has positive effect on economic growth which lasts for about six years. Interestingly, the study discovers that the results of PECM with CRISIS97 and CRISIS08 reported in Table 5.4e (i) are consistent with the findings in IRF. The economic growth respond positively and higher to shocks in the stock market as compare to bank and real estate. It can be said that the stock market contribute positively to economic growth, at the same time, economic progress tends to stimulate the development of the stock market. The evidence from Thailand shows that economic growth is more responsive to stock market. Well-developed stock markets have increased saving and capital accumulation, which leads to the economic growth. The study also notes positive responses of the economic growth to innovation in bank and real estate (Figure 5.6e). The positive response of economic growth to a bank increase is in line with Harrison et al. (1999). According to Harrison et al. (1999), an efficient banking sector could decreases transaction costs and the margin between lending and deposit rates. This in turn increases the share of savings allocated to the investments and lead to higher economic growth.

The forecast error variance decomposition of economic growth in Table 5.6e shows that nearly 61 percent to 98 percent forecast error of shock is explained by its own shock. Among the stock market indices, shock in the Bangkok stock exchange has a larger effect on economic growth and the effects remain strong until the period 20. The real estate comes second and the innovations are able to explain more than 98 percent of its own fluctuations. At the period 20, about 0.25 percent of the error variance in economic growth is explained by the shock in the bank. The economic growth is less

responsive to the innovation in bank which implies that shock in the banking sector has less effect on economic growth.

Table 5.6e: Forecast Error Variance Decomposition for GDP (Y_{gdp}) in Thailand

Period	ΔY_{gdp}	ΔSET	ΔM	ΔR	ΔP	ΔE
1	98.17808	1.179574	0.038161	0.578505	0.017264	0.008413
5	83.18640	9.198465	0.377477	6.976563	0.247948	0.013149
10	69.32862	14.70136	0.499126	14.49804	0.965713	0.007147
20	61.76522	15.61875	0.325126	19.16247	3.106665	0.021770
Period	ΔY_{gdp}	ΔBNK	ΔM	ΔR	ΔP	ΔE
1	98.72874	0.011881	0.219701	0.901275	0.060418	0.077988
5	86.63716	0.116900	1.694385	10.46042	0.209588	0.881544
10	74.76850	0.120186	2.164267	21.14022	0.149631	1.657195
20	69.30944	0.256212	1.466712	26.29985	1.104068	1.563717
Period	ΔY_{gdp}	ΔRES	ΔM	ΔR	ΔP	ΔE
1	98.68650	0.468890	0.082759	0.755410	0.006097	0.000342
5	85.03278	5.652068	0.538552	8.376744	0.399457	0.000395
10	70.63933	10.75972	0.560130	16.29716	1.738152	0.005508
20	62.80752	11.65409	0.341653	20.76619	4.351315	0.079237

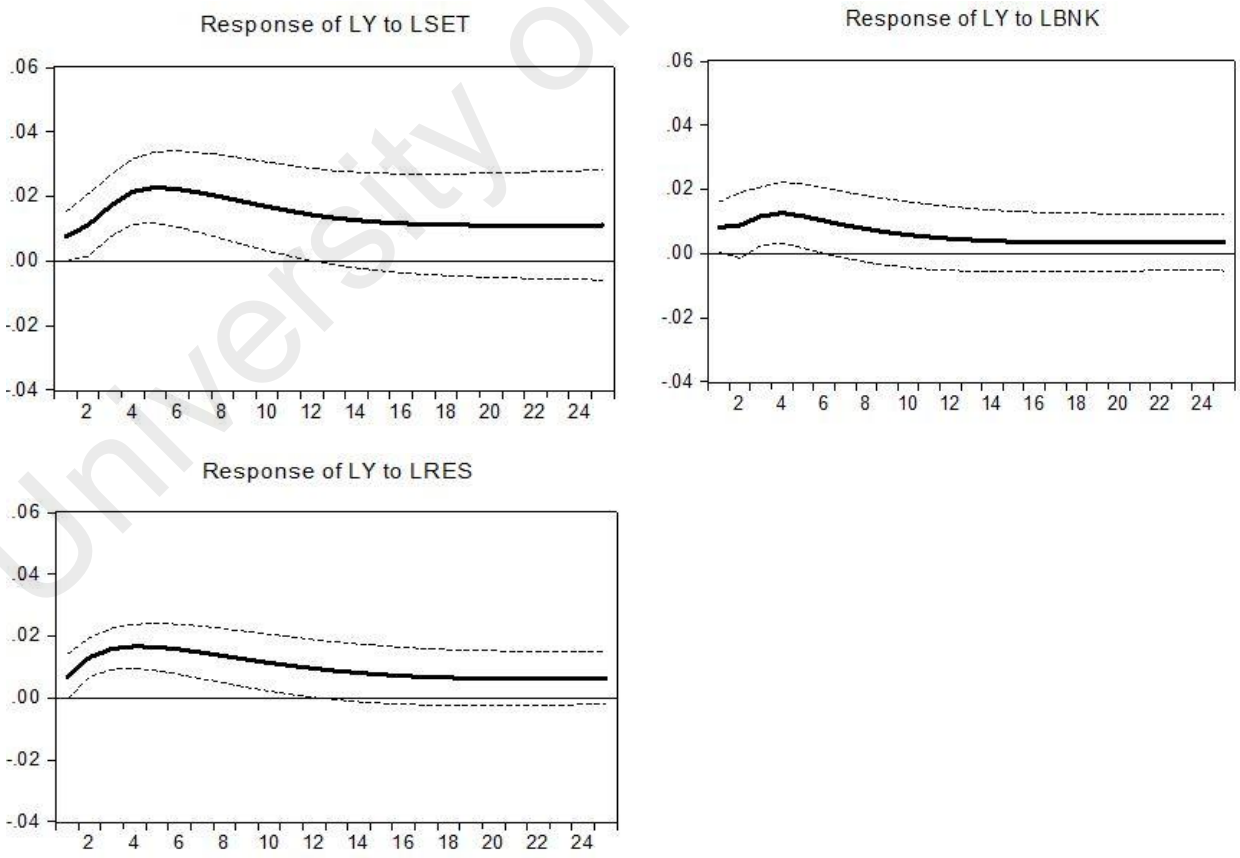


Figure 5.6e: Generalized Responses of GDP (Ygdp) to Stock Indices in Thailand

5.7 Summary of Findings

The main focus of this study is to examine the effects of stock market indices on economic growth through three channels namely stock market, bank and real estate, and also to identify the magnitudes of the effects of the indices on economic growth in ASEAN-5. In doing so, this study able to distinguish either the economic growth is explained by the variable-specific shocks or system-wide shocks. As reported from the findings in the unit root tests, all variables are integrated at the same order of I(0) and I(1), and thus, the study continued with cointegration tests to identify the cointegrating vectors for each estimated model. Results from the cointegration test reveal that all vectors move together in the long-run. It shows that there exist a long-run relationship among the economic growth (Y), stock return indices (stock market, bank, and real estate), the broad money (m), the interest rate (r), inflation (p), and the exchange rate (e).

Findings from PECM in Indonesia for the sample period 1990:1 to 2016:4 show that real estate is statistically positive and significant, but its contribution on economic growth is very small. This finding is consistent with the report by the World Bank (2013) that states Indonesia property market shows weak growth as compared to other Asian countries. Over the past five years, property prices increased 2.5 percent in 2008 to 5.0 percent in 2011. Unpredictable inflation rates and an increase the number of construction projects has led to the poor performance of real estate market and hampered the growth of housing market. Therefore, the government decided to increase subsidies for low-cost housing that allows the banks to avail instant funds from the sale of mortgage claims. Interestingly, the results PECM, IRF and VDC show consistent findings. The responses of economic growth to the stock market innovations were larger than other indices (bank and real estate). The positive and significant response of economic growth to a stock price increase is in line with Demirguc–Kunt and Levine

(1996a &1996b) and Levine and Zervos, (1998). Granger's causality test for multiple time series is used to find evidence of causal relationships between stock market and economic growth along with other monetary variables. The results given in Table 5.5a – 5.5c indicate weak evidence of a unidirectional causality from economic growth to broad money, inflation and exchange rate in short-run for the case of Indonesia. Specifically, causal links are found from economic growth to the interest rate at 5 and 10 percent significance level, from economic growth to the stock market, bank and real estate at 1, 5 and 10 percent significance level, and also from broad money to economic growth at 5 percent significant level respectively.

The evidence from PECM shows that the contribution of banking sector on economic growth is higher than stock market and real estate in Malaysia as reported in Table 5.4b(i). Additionally, the results of IRF analysis show most compelling evidence and consistent with the findings from PECM. The IRF shows the response of economic growth following a unit shock to the bank has a larger effect as compare to other indices. Similarly, the results from VDC reveals that the error variance in economic growth is largely explained by the shock in the bank as compare to stock market and real estate. The findings from PECM, IRF and VDC supports the evidence that the banking development is an important wheel for economic growth (Tang, 2005; Cole et al., 2008; Wu et al., 2010; Law and Singh, 2014; Pradhan et al., 2014a). This suggests that the development of the banking sector may induce higher economic growth by allocating financial resources efficiently and combined with sound regulation of the banking system. A sound banking system instills confidence among the savers so that resources can be effectively mobilized to increase productivity in the economy (see, for instance Tang, 2005; Kim and Lin, 2013; Pradhan et al., 2014a). The evidence of Granger causality reveals that a bidirectional causal links from economic growth is found to stock market (at 10 percent level of significance), bank (at 5 percent level of

significance) and real estate (at 5 percent level of significance). The results suggest that the stock market, bank and real estate sectors play an essential part in explaining the changes in economic growth under the case of Malaysia. It recommends that the previous movements of stock market, bank and real estate indices, alongside the past values of economic growth, can be possibly used to predict the economic growth.

The finding from IRF and VDC in the Philippines shows consistent results. Contrarily, the results from PECM show that the banking sector contributes more to economic growth. The findings from IRF shows that the response of economic growth to a one-unit shock on stock market is higher than other indices. Similarly, the VDC analysis reveals that the shocks from stock market have a greater effect on economic growth and the effect remain strong until the period 20. The findings confirm the role played by the stock market and banking sector is important towards the economic growth in the Philippines. The results from Granger causality presented in Table 5.5a – Table 5.5c reveals that there is unidirectional causality from stock market to real output, and also from bank to economic growth. This findings support the validity of a "supply-leading" view. According to this view, as the economy expands its demand for certain financial instruments increases, leading to the growth of these services. It also indicates that a positive prospective in an economy will lead to positive outlook in its stock market movement in the long-run (Dritsaki and Dritsaki-Bargiota, 2005; Nieuwerburgh et al., 2006; Sinclair, 2008). Meanwhile, the development of the banking sector may induce higher economic growth by allocating financial resources efficiently. A sound banking system instills confidence among the savers so that resources can be effectively mobilized to increase productivity in the economy (Tang, 2005; Kim and Lin, 2013; Pradhan et al., 2014a).

The summary of findings from the PECM, IRF and VDC confirms the contribution and the shock from stock market is an important determinant of economic growth in

Singapore. From this analysis, it can be said that the stock market play a particularly important role in fostering growth. The stock market has real economic effect on economic growth in the long term prospects. As reported by Monetary Authority of Singapore (2008), the stock market capitalization grew from $98 billion in 1991 to $776 billion in 2007 before falling to $385 billion in 2008. In terms of market capitalization to GDP, the ratio rose from 130 percent in 1991 to 319 percent in 2007. It also indicates that the stock market and economic growth are inextricably linked. Therefore, the study confirms that the stock market has a significant effect on economic growth as a whole (Rousseau and Wachtel, 2000; Hassapis and Kalyvitis , 2002; Caporale et al., 2004; Liu and Sinclair, 2008; Cooray, 2010; Kim and Lin, 2013; Pradhan et al., 2013). The monetary variables, including broad money, interest rate, inflation, exchange rate, stock price index, bank index and real estate index, have been proven to significantly interact with Singapore's economic growth via the presence of cointegrating relationship and Granger causal links. The results of the Granger causality test show that the economic growth is found to have bidirectional causality on stock price index and bank index. Meanwhile, the real estate index has a significant effect on economic growth in the short run but not the other way around. The findings support that the economy with a well-developed stock market promotes high economic expansion through technological changes, products and services innovation. This will in turn create a high demand for the stock market products. As the stock market effectively responds to this demand, it will stimulate higher economic growth. Both stock market and economic developments are therefore positively interdependent and their relationship could lead to bidirectional causality.

The results from the PECM, IRF and VDC for Thailand reported in Table 5.4e (i), Table 5.6e and Figure 5.6e, shows consistent findings. The results confirm the contribution and the shock from stock market is important determinant for the economic

growth in Thailand. The variance decomposition represent in Table 5.6e reveals the shocks from stock market has a larger effect on economic growth and the effects remain strong until period 20. The findings is supported by Demirguc–Kunt and Levine (1996a, 1996b) and Levine and Zervos (1998), who found that the stock market is positively and significantly correlated with economic growth. At the end quarter of 2014, the market capitalization of the stock exchange of Thailand (SET) is approximately 304.8 billion baht or 9.24 billion U.S. dollar and its market capitalization is one of the highest values in ASEAN. With this finding, it supports that the SET is the largest emerging markets in the Asian region (Jirasakuldech et al., 2008). Furthermore, unidirectional causal links originating from stock market are found to real economic growth (at 5 percent significance level), banking sector (at 1 percent significance level) and real estate (at 10 percent significance level). The results suggest that stock market play an essential part in explaining the changes in economic growth as well as bank and real estate sector under the case of Thailand.

Table 5.7a: Summary of Findings on Finance-Growth in ASEAN-5

Countries	Parsimonious Error Correction Model (PECM)		
	Crisis 97 & Crisis 08	Crisis 97	Crisis 08
Indonesia	Stock market	Stock market	Stock market
Malaysia	Bank	Stock market	Bank
Philippines	Bank	Stock market	Stock market
Singapore	Stock market	Stock market	Stock market
Thailand	Stock market	Bank	Bank

Countries	Granger Causality Test			IRF	VDC
	Stock Market	Bank	Real Estate	Response on Y_{gdp}	Shock on Y_{gdp}
Indonesia	LY→ LIDX	LY ↔ LBNK	LY → LRES	Stock market	Stock market
Malaysia	LY↔ LKLCI	LY ↔ LBNK	LY ↔ LRES	Bank	Bank
Philippines	LPSEI→ LY	LBNK→ LY	LY → LRES	Stock market	Stock market
Singapore	LY ↔ LSTI	LY ↔ LBNK	LRES → LY	Stock market	Stock market
Thailand	LSET→ LY	LBNK→ LY	LRES → LY	Stock market	Stock market

Table 5.7b: The Effect of 1997 and Global Financial Crisis on Economic Growth

	Stock Market		Bank		Real Estate	
Country/Crisis	1997	2008	1997	2008	1997	2008
Indonesia						
Model 1	√	X	√	X	X	X
Model 2	√		X		X	
Model 3		X		X		X
Malaysia						
Model 1	√	X	X	X	X	X
Model 2	√		X		X	
Model 3		X		X		X
Philippines						
Model 1	X	X	X	X	X	X
Model 2	X		X		X	
Model 3		X		X		X
Singapore						
Model 1	X	X	X	X	√	X
Model 2	X		X		X	
Model 3		X		X		X
Thailand						
Model 1	√	X	X	X	X	X
Model 2	X		X		X	
Model 3		X		X		X

Notes: The finding is based on the results of Parsimonious Error Correction Model (PECM) represents in Table 5.4a(i) – Table 5.4e(iii)

CHAPTER 6: SUMMARY AND POLICY IMPLICATIONS

6.1 Introduction

The concern of this study is related to the failure and collapse of major financial institutions in the developed countries which caused the world economy experienced worst economic downturn and deep recession. The study suggests that by looking at the stock return indices and economic growth in five ASEAN countries, it may be useful to benchmark to what extent of growth is affected by the uncertainty in the stock market. Thus, this study introduces four major objectives, which form the basis of the research. The study intends: (i) To identify the main sectoral stock index that affect economic growth, (ii) To examine causal effect of stock market on economic growth, (iii) To measure the effect of Asian and global financial crisis on economic growth in a model that considering various sectoral indices, with particular reference to stock market, bank and real estate, and (iv)To estimate the influence of economic growth on the volatility of sectoral indices in ASEAN.

The literature review discusses the topic of finance-growth nexus is classified into four sections. The first section discusses the theoretical framework related to the stock market and economic growth. It discusses the relevant theories used in this study. The theories are the quantity theory of money, the loanable funds theory, liquidity preferences, Mundell-Tobin effect and Van Wijnbergen IS-LM model. The second section discusses the finance-growth transmission channels relating to stock market and economic growth. The transmission channel is divided into three channels: stock price, bank lending and real estate price channels. Then, the third section discusses the empirical studies on stock market and economic growth. Finally, the end of the Chapter Three discusses the empirical studies related to stock market, bank, real estate and economic growth. This section extends the literature on stock market and economic

growth by investigating three types of relationships. This section discusses the relationship between: (i) stock market and economic growth, (ii) bank and economic growth, and (iii) real estate and economic growth.

The first objectives examine causal linkages between stock market and economic growth, banks and economic growth, and also real estate and economic growth. The factor that contributes to the economic growth in five ASEAN countries is differing among the countries. The empirical finding from PECM reveals that the contribution of stock market on economic growth is larger as compare to bank and real estate for the case of Indonesia, Singapore and Thailand. Whereas, bank contributes more on economic growth in Malaysia and Philippines. It is important to note that the effect of financial and non-financial sector on economic growth is different among ASEAN-5 countries when taking into consideration of Asian and global financial crisis. The second objective of this study discussed the causal linkage between stock market on economic growth via Granger causality test. This involves examining the relationship of financial and non-financial sector on economic growth. The study found that there are bidirectional causality form economic growth to stock market index for Malaysia and Singapore. The findings support the feedback hypothesis which suggests that the relation between stock market and economic growth could lead to feedback causality. In other words, economic growth and stock market can complement each other. This suggests that stock market play an essential part in explaining the changes in economic growth and vice versa under the case of Malaysia and Singapore. The bidirectional causality between stock market and economic growth in this study are highly consistent with the theoretical predictions of both the finance-growth literature and the endogenous growth models (Greenwood and Jovanovic, 1990; Dritsaki-Bargiota, 2005).

The third objective of this study discussed the effect of financial crisis on growth in five ASEAN countries by incorporating various sectoral stock indices into the model.

The effect of the crisis on economic growth reveals the crisis has real effect in the equation of bank equation and stock market as compare to real estate. Three out of five ASEAN countries (Indonesia, Malaysia and Thailand) show that the magnitude of the Asian financial crisis is clearly associated with the stock market, whereas for the Philippines, the Asian and global financial crisis has no effect on economic growth. Based on this finding, the effect of sectoral stock indices on economic growth is different when taking into account the crisis into model. Interestingly, the global financial crisis had no significant effect on economic growth in all ASEAN-5 countries when various models are considered. Finally, the fourth objective discusses the influence of economic growth on the volatility of sectoral indices in ASEAN-5. The dynamic analysis of the impulse response functions and variance decomposition is focused in this objective to investigate for a shock from economic growth on the movement of stock markets, bank and real estate. The findings from this result consistent with the findings from PECM analysis. The finding reveals that the shock in stock market and bank has bigger effect on economic growth in ASEAN-5 countries. Thus, the study suggests that the economic growth in ASEAN is most influenced by the volatility in the stock market and bank as compare to real estate.

6.2 Research Questions Revisited

The findings reported in the thesis are summarized by returning to the research questions and objectives posed in section 1.3, and empirical findings have been done to answer the research question. Various questions were asked in section 1.3 in order to resolve the problem of to what extents the stock market could adversely affect economic growth in the context of ASEAN-5. In this section, the research questions are answered in the light of the results from the empirical findings in section 5.4. Selected results are highlighted.

RQ1: To what extent sectoral indices affect economic growth in ASEAN-5? Which of the sectoral indices is most contributing to economic growth?

RO1: Identify the main sectoral stock index that affects economic growth.

This question was addressed by identifying the main sectoral stock indices that affects economic growth. The findings of the results gave some ideas of magnitude effects of the stock market, banks and real estate on economic growth. The magnitude effects on economic growth differ among the countries. From the overall perspective, the stock market and banks sector has larger effects on economic growth in five ASEAN countries. Specifically, the findings show that the stock market has greater affect on economic growth in all ASEAN countries except Philippines. Specifically, as reported by Asian Development Bank (2003), the Malaysia stock markets experience a high growth in market capitalization for the 10-year period since 2002. Malaysia's market capitalization increased by 122.8 percent in 2002 to 156.9 percent in 2012, followed by Singapore (112.5 to 150.8 percent), the Philippines (48.0 to 105.6 percent) Thailand (36.4 to 104.7 percent) and finally Indonesia (15.3 to 45.2 percent).

In the meantime, the empirical finding from PECM also shows that the effects of stock market and banks on economic growth have a strong effect as compare to real estate. The significance effect of stock market on economic growth in Indonesia,

Singapore and Thailand is due to the funds from foreign investors through the domestic stock market plays significant role in financing the domestic enterprises which in turn increase the domestic output. The financial sector in particular the stock market tends to stimulate and promote economic growth when monetary authorities adopt liberalized investment and openness policies, improve the size and the regulations of the stock market, and increase the macroeconomic stability (Mun et al., 2008). Meanwhile, in Thailand, the stock market have significant role in explaining the economic growth. This is due to the capital market of Thailand has contributed significantly towards the development of the economy by being a source of funds for all business sectors and providing an alternative destination for domestic and international investment. Furthermore, in 2008 the Thai government deducts taxes for small and medium sized organizations listed on the stock exchange and on property transactions to increase private investment (Datamonitor, 2011).

The empirical findings also show that banking sector is an important determinant on economic growth in the Philippines and Malaysia. From this analysis, it can be said that the banking sector plays an important role in fostering economic growth and have a real effect on growth in the long-term prospects. In the Philippines, the banking sector is reported to be the single largest component of the financial system and continued to be the main source of finance to the private sector (BSP, 2010). In fact, the Financial Sector Assessment Program (FSAP) in the Philippines reports that the country's banking system is dominating the financial system with assets of the banking sector comprising two-thirds of the assets of the entire financial system (International Monetary Fund, 2010). Meanwhile, Malaysia banking sector remains strong and has improved since the 1997 Asian financial crisis. It also show that the asset quality improved with nonperforming loans at 2.2 percent of total loans in 2012, as compare to 15.9 percent in 2002 (World Bank, 2013). This finding from this study is consistent

with the views that banking sector and economic growth is inextricably linked (Greenwood and Jovanovic, 1990; Kaya et al., 2011; Mishal, 2011). Thus, the study confirms that the banking sector can affects as well as promotes the economic growth as a whole (Pagano, 1993; Harrison et al., 1999; Ayadi et al., 2008).

Table 6.2a: Summarize From the PECM Analysis

Countries	Stock Market	Bank	Real Estate
Indonesia	**.040428[b]**	.030605[b]	.022212[b]
Malaysia	.072918[a]	**.080261[a]**	.033830[b]
Philippines	.033984 [a]	**.049692 [a]**	.024945 [b]
Singapore	**.039704 [c]**	.036654 [b]	.036006 [a]
Thailand	**.032023 [c]**	.031197 [a]	.030164 [b]

Note:
1. a, b and c represents significant level at 1 percent, 5 percent and 10 percent respectively.
2. The value represents the coefficient from sectoral indices of stock market, bank and real estate.
3. The coefficient is based on the findings from PECM analysis with CRISIS97 and CRISIS08 output.

RQ2: Is there a causal relationship between economic growth and sectoral indices of stock market, bank and real estate in ASEAN-5?

RO2: To examine causal linkages between stock market on economic growth. This involves examining the relationship of financial and non-financial sector on economic growth.

By examining the causal linkage between stock market and economic growth in ASEAN-5 by incorporating the sectoral stock indices into the model, the results from the Granger causality found that there is a bilateral causal relationship between stock market and economic growth in Malaysia and Singapore. The bidirectional causality also found between banks and economic growth in Indonesia, Malaysia and Singapore. The argument in favor of the bidirectional causality stressed that development in the stock market and banking sector is indispensable for economic growth and economic growth requires a well-developed stock market and banking sector.

The findings support the feedback hypothesis which suggests that the relation between stock market and economic growth could lead to feedback causality. In other words, economic growth and stock market can complement each other. This suggests that stock market play an essential part in explaining the changes in economic growth and vice versa under the case of Malaysia and Singapore. It is evident from the literature that the economy with a well-developed stock market promotes high economic expansion through technological changes, products and services innovation. This will in turn create a high demand for the stock market products. As the stock market effectively responds to this demand, these changes will stimulate higher economic growth. Both financial and economic developments are therefore positively interdependent and their relationship could lead to bi-directional causality.

Table 6.2b: Summary from Granger Causality Test for ASEAN-5

Countries	Granger Causality Test		
	Stock Market	Bank	Real Estate
Indonesia	LY→ LIDX	LY ↔ LBNK	LY → LRES
Malaysia	LY↔ LKLCI	LY ↔ LBNK	LY ↔ LRES
Philippines	LPSEI→ LY	LBNK→ LY	LY → LRES
Singapore	LY ↔ LSTI	LY ↔ LBNK	LRES → LY
Thailand	LSET→ LY	LBNK→ LY	LRES → LY

RQ3: Are the effect of the Asian and global financial crisis has a significant effect on economic growth? To what extent Asian and global financial crises affect economic growth in ASEAN-5?

RO3: To measure the effect of Asian and global financial crisis on economic growth in a model that considering various sectoral indices, with particular reference to stock market, bank and real estate.

The effect of sectoral stock indices on economic growth is different when taking into account the Asian and global financial crisis in the model. The findings show that the global financial crisis had no significant effect on economic growth in ASEAN-5 when various sectors (stock market, banks and real estate) considered into the model. As have been reported by Monetary Authority of Singapore (MAS) and Bank of Thailand (BOT), there are no major differences in the reactions of domestic and foreign-owned banks during the global financial crisis. For instance, in Thailand, both foreign and local banks became more cautious in lending to risky businesses especially small medium enterprises, and reduced their off-balance sheet transactions, mainly in foreign exchange derivatives. It may be noted that in Thailand, domestic currency financing in money markets was unaffected and the central bank did not need to resort to special or unconventional measures. Likewise, the Singapore's banking sector managed to survive during the global financial crisis without suffering severe damage. The strong position of the bank before the crisis and limited exposure to toxic assets does not affect the banking sector in Singapore. According to the Singapore Commercial Banking Report in 2012, three major Singaporean banks (DBS, UOB, and OCBC) are well capitalized with tier 1 capital ratios of 12.7 percent, 14.7 percent, and 13.9 percent, respectively, and posted a strong year-on-year profit increases of 16.0 percent, 12.4 percent, and 32.5 percent, respectively in the first quarter 2012. The statement shows that despite the fact that Singapore's economy is small and vulnerable to global economic risks, the city-

state's banking sector is on solid footing to deal with a global economic slowdown. However, the Asian financial crisis has significant effect on economic growth in Indonesia, Malaysia and Thailand. The crisis that occurs in 1997 has major effects on the economy growth. There was severe output disruption in 1998. The Indonesian economy had plunged into a deep recession in 1998 with overall growth at -13.7 percent (Badan Pusat Statistik Indonesia, 2012). The crisis also led to a significant drop in output and a significant increase in poverty rate. The increase in poverty and the decline in income per capita were consistent with output contractions. In fact, by the end of 1997 16 commercial banks were closed and access to credit became very difficult and interest rate increased significantly. This has contributed significantly to output contractions in many sectors in Indonesia.

Table 6.2c: The Effect of 1997 and Global Financial Crisis on Economic Growth

	Stock Market		Bank		Real Estate	
Country/Crisis	1997	2008	1997	2008	1997	2008
Indonesia						
Model 1	√	X	√	X	X	X
Model 2	√		X		X	
Model 3		X		X		X
Malaysia						
Model 1	√	X	X	X	X	X
Model 2	√		X		X	
Model 3		X		X		X
Philippines						
Model 1	X	X	X	X	X	X
Model 2	X		X		X	
Model 3		X		X		X
Singapore						
Model 1	X	X	X	X	√	X
Model 2	X		X		X	
Model 3		X		X		X
Thailand						
Model 1	√	X	X	X	X	X
Model 2	X		X		X	
Model 3		X		X		X

Notes: The finding is based on the results of Parsimonious Error Correction Model (PECM) represents in Table 5.4a(i) – Table 5.4e(iii)

RQ4: Does the economic growth respond to the shocks in stock market, bank and real estate? Which of the sectoral indices shocks most?

RO4: To estimate the influence of economic growth on the volatility of sectoral indices in ASEAN-5. The dynamic analysis of the impulse response functions and variance decomposition is focused in this objective to investigate for a shock from economic growth on the movement of stock markets, bank and real estate.

From the IRF results, this study captures the relative importance of shocks in sectoral stock indices and their influences on the economic growth. In Malaysia, the economic growth responds positively and significantly to shocks in the stock market, bank and real estate. The findings found positive response of economic growth to bank. The result from IRF and VDC is consistent with the earlier finding from PECM that the effect of banks on economic growth is statistically significant and larger compared to stock market and real estate. This means that, for the case of Malaysia, the banks are the dominant financial institutions in Malaysia. As reported by IMF (2013), the banking sector control most of the financial flows and possess more than 70 percent of the financial system's total assets in Malaysia. The findings suggest that the growth of the economy in Malaysia is closely related to the well-being of the banking sector.

Interestingly, for the case of Indonesia, Philippines, Singapore and Thailand, the error variance in economic growth is mostly explained by the shock in stock market. These four countries have the same shock effect from the bank model. The finding suggests that well-developed financial market promote growth by channeling financial resources to the most productive uses. More importantly, the stability in the stock market not only brings stability to the growth, but also to the economy as a whole.

Table 6.2d: Summary of Findings from PECM, IRF and VDC Analysis

Countries	Parsimonious Error Correction Model (PECM)			IRF	VDC
	Crisis 97 & 08	Crisis 97	Crisis 08	Response on Y_{gdp}	Shock on Y_{gdp}
Indonesia	Stock market	Stock market	Stock market	Stock market	Stock market
Malaysia	Bank	Stock market	Bank	Bank	Bank
Philippines	Bank	Stock market	Stock market	Stock market	Stock market
Singapore	Stock market	Stock market	Stock market	Stock market	Stock market
Thailand	Stock market	Bank	Bank	Stock market	Stock market

6.3 Research Contributions

This section focuses on the contributions of the study. The contribution of this study is divided into three contributions: methodological, empirical and practical.

6.3.1 Methodological Contributions

The main methodological contribution of the research has been the combination and application of VECM with the parsimonious. From the VECM analysis, the cointegrated variables are proved to be important determinant of economic growth. This study shows that stock market, banks and real estate sectors is important determinants for the economic growth in ASEAN countries. It resolves the conflicting views in the literature on the earlier study. The variable has a significant effect on economic activity significantly. However, the intensity of the variables affecting the economic activity varies across the countries.

Furthermore, the IRF and VDC analysis provides information on how economic growth responds to shocks in financial and non-financial sectoral indices. Understanding the properties of the forecast errors is helpful in uncovering interrelationships among variables in the system. Thus, in the context of this study, it allows us to explore the relative importance of financial sector in accounting for variations in economic growth. The findings from IRF and VDC highlight the shock and error variance in economic growth were mostly explained by stock market and banks. This finding suggests that stock market and banking sector provides the best leading information for economic activity.

6.3.2 Empirical Contributions

The empirical contribution of this study is presents a comprehensive model that integrates sectoral stock indices of the stock market, banks and real estate with macroeconomic indicators in the context of five ASEAN countries. The empirical findings contribute to our understanding that the inclusion of sectoral stock indices estimates can provide meaningful evidence on financial sector capability to stimulate economic growth. Besides, this study contributes to the literature by providing a thorough analysis on the interactions among stock markets, banks, real estate and economic growth. To this purpose, the study estimates simultaneously three equations in the system to allow for the joint determination of stock market, banks, real estate on economic growth, along with other potential explanatory variables. This approach not only contributes to our understanding and provides comparative evidence in the findings, but also the magnitude of estimates in understanding how the sectoral indices react to the changing in the global economic uncertainty.

The findings of the study suggest that the stock market are important determinant for the economic growth especially in developing countries. Unstable financial system would destroy the economic system as a whole. The stock market and banking sector are conducive to economic growth and important for long-run growth. Other macroeconomic indicators which also important to the economic growth are money supply, interest rate, inflation and exchange rate. All of these indicators theoretically contribute to the economic growth and has a significant effect on stock market. A change in the monetary policy through money supply or interest rate is expected to affect stock prices. This indicates that monetary policy will remain accommodative to economic growth. Finally, the application of disaggregate data from stock market helps to analyze the findings of the case study. The finding shows that the stock market and

banks is an important determinant to economic growth in the ASEAN countries particularly.

6.3.3 Practical Contributions

The practical contribution of this research is the detailed insight provided by the three empirical findings. The first empirical finding is the stock market-economic growth links reveals the empirical importance of sectoral indices which consists of stock market, banks and real estate. The findings of the study reveal that the inclusion of sectoral estimates provides meaningful evidence on stock market and banks capability in stimulating economic growth. This means that the stock market and banks responding to economic growth through the monetary targeting such as interest rate and money supply. The shocks from these variables show that the error variance in economic growth was mostly explained by the shocks from stock market and banks. This approach not only provides more comparative evidence in the findings, but also the magnitude of estimates in understanding how disaggregates sectoral data react to the changes in the economic activities.

6.4 Policy Implications

Stock market and banking sector have positive effect on economic activity. The positive link between stock market and bank on economic activity measures the importance of financial intermediation. This suggests that financial modernization promotes economic growth. Rousseau and Vuthipadadorn (2005), Levine and Zervos (1998) and Levine (1998) also show that banking development is robustly linked with economic activity. The banking system provides important service for economic growth. It mobilizes savings, identifies creditworthy borrowers, pools risk and facilitates transactions (Levine and Zervos, 1998; and Levine, 1998).

On policy implication, the evidence suggests that further development in the financial system is fundamental for better economic performance. No doubt there may some undesirable consequences which are harmful to the economy, but on averages its beneficial effects outweigh the consequences. A more well-balance outcome would be achieved by emphasizing on strengthening legal and regulatory system that protect creditor rights, contract enforcement compliance with law and accounting standard (see Levine et al., 2000; Beck et al., 2000; Levine and Zervos, 1998; Levine, 1998). Singapore experience is the closest example and a good model that can be cited and learned by others. Singapore's financial market is well-developed with firm legal and regulatory system, strict contract enforcement and accounting practices that are in compliance with laws.

Based on the findings, it is stock market that matter most in the economic growth, but from the findings different countries respond differently to the economic growth. Some countries are more sensitive to a particular indicator and not to other country. Nevertheless, it is important that all the indicators should be monitored as information contained in the variables are still useful. But, more attention should be placed on indicators that have closest relationship to a specific target of desired economic growth.

Looking at the macroeconomic variables, broad money (M3) should be given more consideration by policy makers in Singapore. This is because the evidence from VDC suggests that the economic growth in all three models (stock market, bank and real estate) respond mostly by the shocks of money supply. The money supply serves as the driving force for fluctuations in the economic growth. Therefore, it is a good indicator of economic growth. The variable is exogenous and is a reliable instrument of monetary policy.

For future studies, this study suggests more investigations into the stock market and economic growth should focus on various types of industries. This is because there is possibility that economic growth may respond differently to other industry. This evidence will provide some information to the policy makers on the effects of the growth in certain industries. It is also useful and more sensible that further research should include more data and explore different techniques to examine empirically the finance-growth nexus. Different method of testing exogeneity of the variables should be engaged in the future research.

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